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URBANISATION IMPACT OF THE CITY OF SERRES

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Abstract. Continuous population increases, coupled with movements of people in search of better living conditions, led to the creation of population concentration nuclei that became the urban centers of today. The reasons, which led to the urbanisation of the city of Serres are the following: 1. The development of the secondary sector (24.34% of active population); 2. The expansion of the tertiary sector (71.55%); 3. The abandonment of agricultural land (4.11%); 4. The continuous inflow of human potential, due to refugee and economic immigrant movements; 5. The functioning of institutions of higher and university education. Urbanisation resulted in: 1. Occupation of natural environment areas. Occupation of agricultural land; 2. Abuse of natural resources. Location of quarries; 3. Water overconsumption. Aqueduct, water provision facilities; 4. Electrical energy overconsumption; 5. Wastes overproduction. Necessity for the construction of a landfill site; 6. Noise pollution. Marked increase of noise levels in central locations; 7. Road traffic problems – transportation. Centrally designed urban services and public transport plan, lack of pedestrian ways and parking spaces; 8. Aesthetic spatial degradation; 9. Light pollution. Threatens the disappearance of night skies; 10. Lack of plan adaptation to space and its peculiarities. City plan extensions, with minimal interventions, which are conducted without any essential result.

Keywords: demographic development, the ground as natural resource, the impacts of human actions, the tragedy of the commons, environmental impact assessement.

AIMS AND BACKGROUND

The reasons leading to the urbanisation of the city of Serres are:

1. In the last two hundred years, i.e. during the era of the industrial revolution, the gaining of significance of the secondary sector[1] and the further expansion of the tertiary sector, have had a dramatic impact on production conditions, shifting

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employment positions toward the city[2]. Thus, rural workers moved away from agricultural employment and formed the new urban dwellers, or rather the proletariat[3].

2. If we add the movements of refugees and economic migrants from the less developed countries (e.g. Albania, Serbia, Bulgaria, Russia, etc.)[4] to the above mentioned internal migration toward the city of Serres, we realise the magnitude of these constant inflows of human potential that cities have experienced and continue to experience.

3. It has been determined that the "sun belt" comprised of the Mediterranean regions, attracts temporary or permanent immigrants, many of whom are senior citizens who are not in search of employment but rather seek more pleasant climatic conditions and way of life.

4. The establishment of higher educational institutions, with the functioning of a university-level Physical Education School and six Technological Education Institute (TEI) Faculties, has increased the city's population by 9000 persons, while this figure is estimated to rise further to 13 000 in the three year period to follow[5].

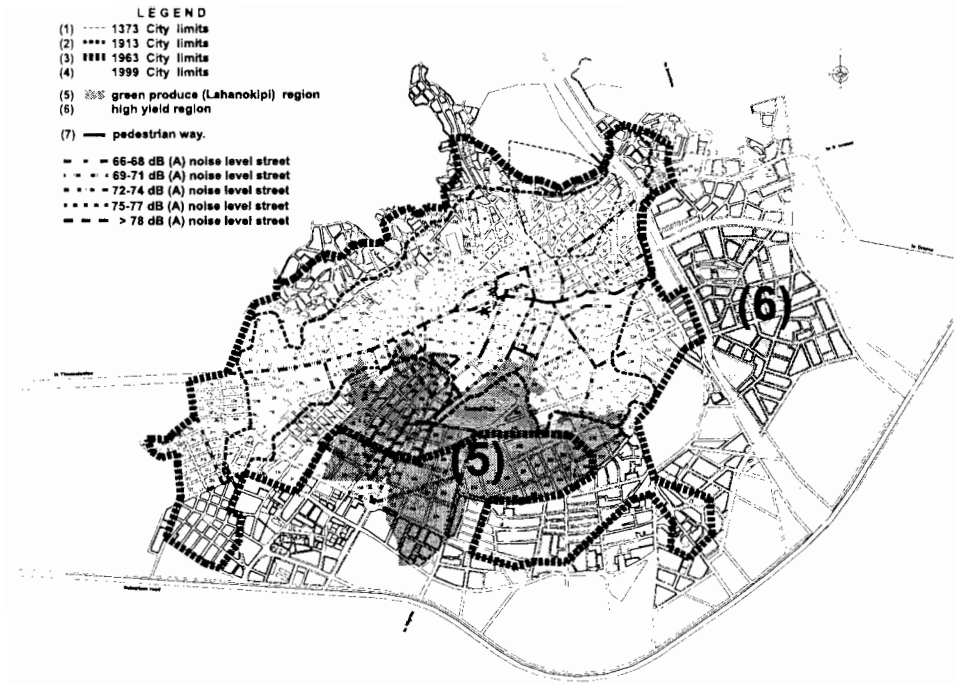
As in the past, this process of urbanisation resulted in a negative impact on the visible and invisible environment as well as on natural resources in general. However, the speed and intensity of the process of urban development currently in operation transform this environmental impact into a major problem. A number of these consequences are presented below, while, of course, this presentation is by no means complete. We will not attempt here to present these consequences in any hierarchical order according to their intensity, nor will we attempt to categorise them according to priorities that must be set to address them. Both the intensity presented as well as the corresponding measures vary and should be differentiated from case to case. This is so due to the fact that both geographical and socio-economic conditions of reference present an important degree of variation.

RESULTS AND DISCUSSION

The consequences of this urbanisation process are:

Occupation of natural areas. This is the most common practice followed during the legally prescribed as well as the informal and non-legally prescribed process of expansion of city and settlement master plans. The new areas incorporated are usually forests and forest-related areas, mountainous areas, coastal and riverside zones, but also river and creek surfaces and even areas designated as natural habitats.

In Map 1 of the city of Serres we observe the evolution of the city from 1373 till today. In 1373 the city occupied 266 acres (perimeter 1) (Ref. 6), in 1913



Map 1. City of Serres

(perimeter 2) – 1900 acres (Ref. 7), in 1963 (perimeter 3) – 3760 acres (Ref. 8), while with the last expansion under the 1998 General Urban Master Plan (GUMP) the city's surface grew to 7000 acres (perimeter 4) (Ref. 9). It is estimated that between 30 and 40% of the city's population own a piece of land including a house in some rural settlement of the Prefecture of Serres.

Occupation of rural areas. The areas and installations servicing primary production activities such as agriculture, animal breeding, flower growing, are constantly shrinking in favour of housing development, despite the fact that such activities cover basic food provision and other related needs. Despite a certain negative environmental impact such as soil and water pollution from fertilisers, these activities generally contribute to the ecological balance of regions and cities. Especially in reference to cities and city planning, certain rural areas should be regarded as areas of designated agricultural use and should preferably be maintained as such.

In Map 1 of the city of Serres an area constituting the green produce gardens (lahanokipi)[10] is delimited with gray scale (5). This area has a surface of 1011 acres and was included in the street lay out and housing construction plan of 1925. This area characterised by rich water resources was cultivated primarily with vegetables to be consumed in the city and the surrounding areas. There is an

additional area (gray scale (6)) of 610 acres (Ref. 11), which disposes a modern irrigation network (pressure vanes) and possesses high yield characteristics, which was included in the 1998 Urban Master Plan extension and is scheduled to be built in the near future.

Abuse of natural resources. All new buildings as well as infrastructural projects require for their completion building and construction materials, a portion of which is a result of mining, quarrying or forestry works. If we add to this the requirements in equipment and maintenance materials, we realise the degree of depletion of the natural space in the proximity as well as further away form settlement expansion sites.

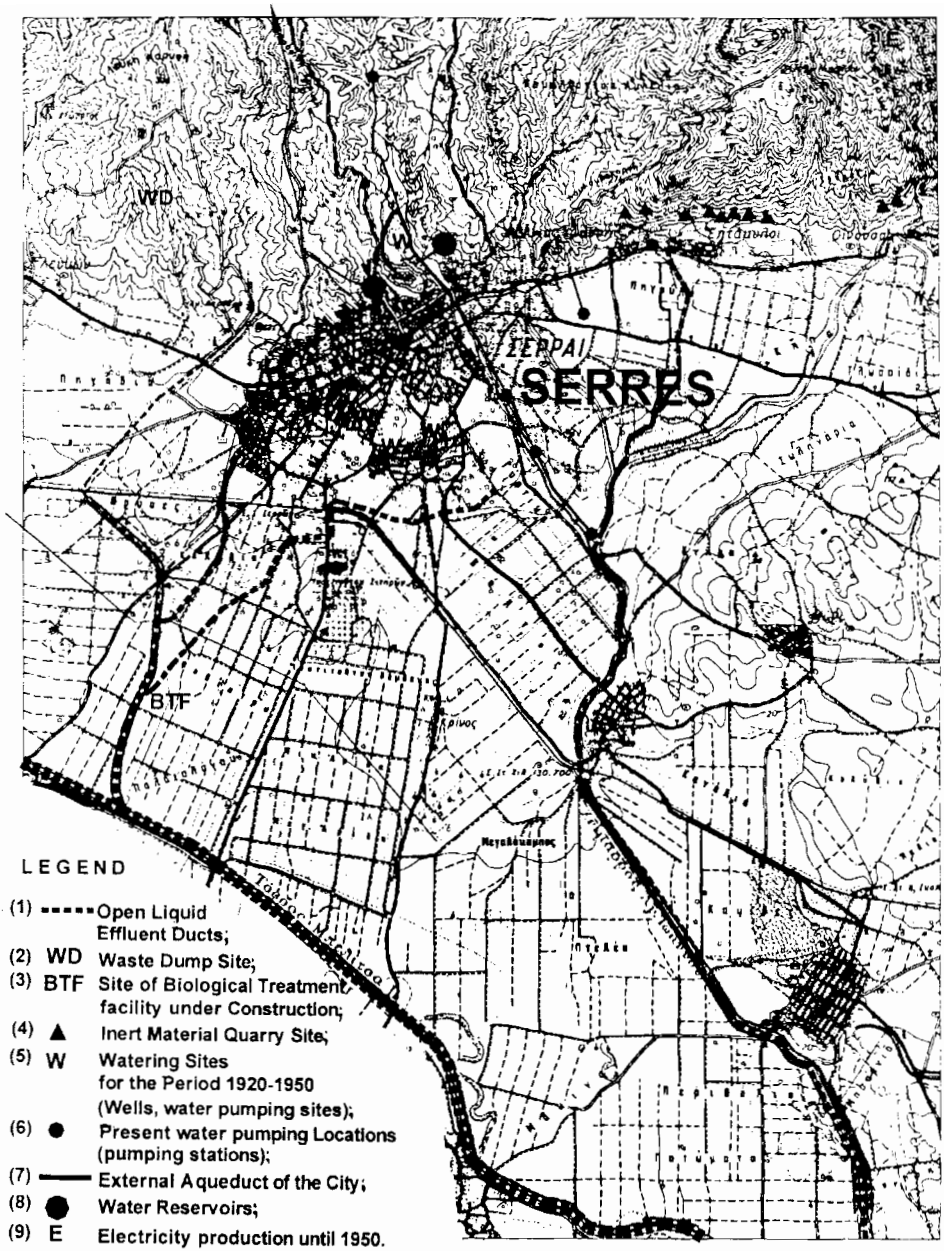
Map 2 of the wider region points out the location of 10 quarry installations (No 4), comprising a total area of over 200 acres. These quarries had been in operation for many decades until quite recently, providing inert materials, without any attempt at re-establishment of the pre-existing natural features at their sites. These quarries are located to the north of the settlements of Aghios Ioannis, Eptamila and Oinoussa that are currently becoming peripheral suburban settlements of the city of Serres.

Water overconsumption. Among natural resources, water holds a primary place of importance, since it is not only necessary for drinking but serves to fulfill quite a number of other, urban functions. Especially regarding urban expansion projects, water is a necessary primary input required in large quantities. It is noted that in certain regions of the planet the problem of water scarcity is quite acute and seems to assume increasingly alarming dimensions.

In Map 2 of the wider Serres region that follows, we present the water provision sites in the years 1900-1950 (No 5). These sites were either springs with drain pipes or water wells inside the city or in nearby locations. External water aqueducts and water drilling sites from which water necessary for the provision of drinking water to the city of Serres is currently taken, are shown in Nos 6, 7, 8 (Map 2). There is currently only one drain pipes site still used for drinking water provision. Also shown is the area that currently provides the city's drinking water, compared to the 1900-1950 period.

The Municipal Water Utility of Serres (MWUS) estimates that up to date water losses due to leakage amount to about 40% of total. Currently, the yearly sum total of water consumption in the city amounts to 8 mil. m^3, the average daily consumption per capita standing at about 180 l, while the average daily consumption per capita for the country as a whole stands at 136 l (Ref. 12).

Energy overconsumption. Manual construction and technical work of the past have given their place to mechanical work and, to a large extent, to automated work. Human or animal bodily force has to a significant degree been replaced by all types of mechanical tools. This development, generally regarded as a form of



Map 2. Wider Serres region

progress since it reduces human effort, is nevertheless energy consuming. When the energy offered is produced by the use of non-renewable resources, the environmental impact locally or on a wider scale may be significantly negative.

The city of Serres is provided with the energy it consumes by the Public Electricity Utility (PEU) and through the use of fossil fuels (diesel, fuel oil). There are no renewable energy sources in the wider Serres area, with the exception of solar collectors, installed mainly on one-family dwellings. In 1954, electricity consumed was produced at a "mild" hydroelectric facility, the Nasioutzik plant at Timios Prodromos monastery, situated to the northeast of the city of Serres, as well as two diesel powered electric generators in the city (their locations are presented in Map 2, No 9). In Table 1 that follows we present a series of electricity related indices for the Prefecture of Serres[13].

Table 1. Electricity related indices for the Prefecture of Serres

Year	1954	1969	1998
Per capita consumption	80 kWh	633 kWh	3422 kWh
Middle and low voltage network	2.2 km	1661 km	3700 km
Number of customers		55 800	102 000

Overproduction of solid and liquid wastes. One of the most well documented consequences of the process of urbanisation is the increase in the volume of both solid and liquid wastes produced. These wastes are very difficult to recycle naturally. In other words, it is very difficult for the corresponding pollution to be neutralised by natural processes alone, as had been the case in the past.

In Map 2 (No 1) of the wider region, we present the open (exposed) channels through which urban effluents are led to the technical open moat of Belitsa which in turn exits into the Strimonas river. Until today, these wastes undergo no additional treatment of any kind. In the last few months the biological treatment plant (No 3) has began partial operation, along with the installation of closed ducts funneling the wastes to the treatment plant. Currently, the average daily production of effluents stands at 13 200 m^3 (Ref. 14). The place of burial of solid litter appears in Map 2 (No 2). There is no environmental protection installations there today. A space of sanitary burial of litter will function immediately.

Noise generation. Noise is also included among other environmental impacts. Noise is the result of construction and other activities related to building works as well as street traffic increases. Noise is of course produced by a plethora of other city activities as well.

Map 1 of the city includes a presentation of city streets where noise levels exceed 66 dB (Ref. 15). We note that while acceptable noise levels stand at 55-60 dB, in many streets with heavy traffic noise levels exceed 78 dB. It is only in

secondary streets that noise levels stay within limits acceptable for a reasonable living.

Generation of excessive transportation movements. The expansion of the city results in a still greater volume of transportation movements of people, something which obviously worsens quality and has a negative impact on space. In contrast to the means of transportation of past periods (pedestrians, bicycles, carriages, non-mechanised vessels, etc.) the common transportation means of today have very intense negative environmental consequences.

In the city of Serres there are no networks of reserved bicycle ways, nor are there streets designed or reserved for "mild" modes of circulation. There are but a few pedestrian ways in the city center, presented in Map 1 (No 7) of the city.

Aesthetic spatial degradation. While natural spaces generally maintain a balance expressed in their plastic forms, the penetration into these natural spaces of human-made activities and products of a growth process without controls, especially when conducted in a manner that lacks adequate study, normally has an intense negative aesthetic impact.

Until today, no measure has yet been introduced aiming at the aesthetic upgrading of the city, with the exception of the functioning of the Architectural Committee before the final approval of certain types of building permits. It should be noted, however, that with precious few exceptions, the competent City Planning offices do not exercise any control as regards the compliance of construction projects implementation to their corresponding studies approved by these authorities at pre-construction phases.

Light pollution. Another impact of human penetration into nature is pollution stemming from light emanating sources. This kind of pollution basically comes from excessive artificial lighting, even during the day but primarily at night, something that disrupts the 24-hour cycle of nature and causes problems in the fauna and flora of an area, or even contributes to their diminution and extinction. It obviously disrupts natural lighting conditions and blurs nightly skies.

Until today, no measure is in place and no control is conducted regarding light emanating commercial signs, etc.

Lack of plan adaptability to space and its specificities. This last point is related to the unacceptable prescribed policy choices included in the plan. This plan can typically be called a street lay out plan or a city planning study, but it often constitutes only a random break up of space into building blocks, and is characterised by intensely over exploitative intentions as regards spatial usage coupled with very poor results.

Following the drawing up of the first urban master plan for the city of Serres in 1925 (building blocks marked in black colour in Map 1), city extensions beyond the settlement borders of 1923 were implemented by Prefectural Decrees, with no

adaptation whatsoever to space and its specificities. In 1985 an effort commenced with the drawing up of the General Urban Master Plan (GUMP), aiming at the extension of the city (building blocks in the areas designated for this expansion are shown in Map 1, No 4). However, regarding the areas already built under previous construction regimes, only a limited number of interventions are possible, with serious doubts as to their effectiveness and intended impact.

Public goods have the following property in their pure form: once they are produced, no person can be excluded from their use at any quantity even when no price is paid. In contrast, private goods, after they produced, belong exclusively to those who buy them at a price. The main repercussion of environmental decisions being about public goods and externalities is that they invite a behaviour that can be characterised as that of a free rider. Wherever many individuals use a scarce resource in common, the degradation of this resource will be an unavoidable consequence (the tragedy of the commons). The tragedy of the commons notion applies as readily to traffic congestion, transboundary pollution, high fertility rates in rural areas, and numerous other situations, which are threaten by overpopulation, excessive economic exploitation and careless over-use and abuse by such activities as tourism and recreation.

Finally, for an environmental evaluation to be relevant in the context of an effort to engender cooperation as a strategy to avoid the tragedy of the commons, it must: (a) seek to reach results that will point to decision option that shakeholders can prefer as collective choices over individual choices; and (b) test the sensitivity of these results to factor that promote cooperation.

CONCLUSIONS

Continuous population growth creates a constant need for urban planning. Some of the critical issues that call for ceaseless attention include the specification of land use zones, the design and development of transportation networks, the adoption of building design regulations, the preservation of landmarks and cultural monuments, the disposal of waste, etc. for each one of these issues there are alternative choices, all theoretically sound, but each with differing impacts according to a number of criteria ranging from economic, environmental, aesthetic, cultural, quality of life, etc. This is an example of a need of a comprehensive evaluation of all these impacts before any choice for an urban planning element is made. Hence, there is a definite need to assign a "value" to all these impacts so that the debate can reach a conclusion as to the fate of the city. Environmental impact assessment is a multidisciplinary task depending entirely on scientific and engineering calculations. Environmental evaluation seeks to place a "value" on the impacts of a potential decision (or decision alternatives) so that a judgment on its acceptability (comparative advantage) can be made.

The urban planning requires communication, information, value discourse, negotiation, binding agreements and institutions for enforcing these agreements.

"What is common to the greatest number has the least care bestowed upon it. Everyone thinks chiefly of his own, hardly at all of the common interest."

Aristotle (*Politics*, Book II, Ch. 3)

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