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**TERRITORIAL ASPECTS OF STATISTICAL RESEARCH IN STATISTICS OF SERBIA
(FEDERAL REPUBLIC OF YUGOSLAVIA)**

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Contributed paper

1. Territorial research in the statistical system of official statistics of the Republic of Serbia (also in Yugoslavia) is accomplished through determining and updating territorial units. These units, together with the updated Register of Territorial Units (RTU), serve as a basis for conducting decennial censuses of population, households, dwellings and agricultural holdings, in accordance with quinquennial statistical research programs of national importance.

2. A unique stable network of smaller territorial units (Statistical Areas - SA) was formed at the end of the fifties by neutralizing the disturbing impact of changes in the administrative-territorial breakdown of national territory. This network covered the entire territory of Yugoslavia and still today (in Yugoslavia) serves as a unique and stable base for stratification, reorganization and territorial identification of statistical data in all statistical research. The most important goals of statistics were fulfilled through:

- successful organization and conducting of statistical research;
- regrouping of statistical data due to administrative-territorial changes;
- regrouping of statistical data with the aim of determining special functional territorial units for analysis of territorially differentiated phenomena and relevant factors;
- stratification and sample planning.

3. The stability of the SA network has been preserved to date, with some small changes (updating and correction of borders in strictly defined cases), on grounds of methodological and legal prescriptions. Since 1961 (the year in which the SA network of the territory of the Republic of Serbia was established) when the total number of SA was 14 693 with an average area of 5,6 km², through to 2001 number of SA increased to about 15 950 with an average area of 5,5km².

4. Statistical Areas are broken down into Enumeration Areas (EA) according to the relevant criteria prescribed by methodological instructions for conducting the preparation of population censuses. In contrast to SA network, the EA network is variable, i.e. the number of EAs in one SA may vary from one census to another.

5. Statistics of Serbia, in close cooperation with the Cadastral Office, municipal services and other public services and organizations, defined descriptions of borders and sketches (maps) of SAs and EAs to

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form a Statistical Cadastre (as a functional unit of statistics) to conduct decennial censuses of population, households, dwellings and agricultural holdings in the period 1996 to 1981. Since the preparations for the Population Census began in 1991, the graphical presentation of SAs and EAs for the needs of statistics is the responsibility of the Cadastral Office of Serbia.

6. The establishment of the Register of Territorial Units in 1988 had an impact on the distribution of obligations and the conducting of research at all levels of the statistical system (federal, republican, etc.). Since then, the main tasks of statistics are:

- establishing methodological bases for conducting Central Evidence and Central Register of Territorial Units;
- collecting data about elementary territorial units;
- launching a processing project, organization and data protection, and so on.

7. Republican Cadastral Offices in Yugoslavia, as the organizations responsible for maintaining graphical presentations of territorial units, are responsible for the following principal tasks:

- updating of graphical presentations of territorial units of the Register;
- making graphical presentations (sketches) and descriptions of borders of SAs, and so on.

8. On the basis of relevant legal and methodological prescriptions, the Register of Territorial Units (RTU) contains and maintains the following units:

- republics and provinces;
- towns;
- municipalities;
- local communities;
- cadastral municipalities;
- settlements;
- SAs;
- streets and house numbers.

9. A republic is a territorial unit determined by the Constitution of Yugoslavia, and an autonomous province is determined by dispositions concerning territorial organization of the Constitution of the Republic of Serbia. The territory of a republic or a province can not be altered without changing the borders.

10. A town is defined as a separate territorial unit – a settlement that can be divided into one or more municipalities.

11. A municipality is a territorial unit where citizens execute local self-government activities. The name and borders of a municipality are decreed by republican law.

12. Local communities as territorial units are formed within the framework of a municipality, with the aim of a more direct accomplishment of municipal services. Borders of local communities may disregard borders of SAs, in other words the border of a local community could overlap one, two or more borders of a SA. The area and border of a local community is determined by the areas and borders of constituent EAs.

13. Cadastral municipality, as a rule, covers the area of one settlement. There are exceptions when one cadastral municipality covers the territory of two settlements, or when more than one cadastral municipality exists on the territory of one settlement.

14. A settlement is an anthropogeographic entity with its own area and distinct name, irrespective of the number of settled houses. Name, type and borders of settlements are decreed by republican law.

15. A street is a statistical observation unit and, as such, belongs in the category of territorial units.

16. In 2000, the Republic of Serbia was composed of 190 municipalities, 6,155 settlements, 5,823 cadastral municipalities and about 4,500 local communities. With the exception of these units of the RTU, the territory of the Republic of Serbia is broken down into 29 districts and the City of Belgrade. Districts are not units of the RTU and they have a purely administrative significance. Comparing these territorial units with the European Nomenclature of Territorial Units (Nomenclature des Unités Territoriales), NUTS 2 level is comparable with the level of republics, NUTS 4 level with districts, and NUTS 5 level with municipalities.

17. Every unit in the RTU has a unique identification number, which is calculated using modulo 11 procedure. The lowest level for which the results of statistical research are regularly published is at the municipality level. However, because all reporting units in the identification section of the statistical forms report the identification number of the settlement in which they are placed, it is possible to obtain results at a settlement level for statistical research using this identification number as a key. The lowest level of territory for which results can be obtained on the basis of collected reports of statistical research is at the settlements level. Republic – Municipality – Settlement is a real hierarchical classification, in other words republic is composed of an integer number of municipalities, and municipalities are broken down into an integer number of settlements. It possible to obtain results for sub-settlement levels, but only in ten-year periods of censuses, on the basis of EAs. Bearing this in mind, it is clear that in Statistics Serbia today we have the capabilities to produce small area statistics.

18. Every alteration of territory of any territorial unit in the RTU imposes changes down to the level of a SA.

19. A SA is a territorial unit, which represents the connection between register-based statistical research of territory and area-based research, particularly population censuses. A EA is not a unit of the RTU and, as such, is an exclusively statistical category connected to population censuses.

20. Within the framework of the RTU, a SA is the lowest territorial unit for which exists the obligation to run a description of borders (on the Form KSK-4G) and graphical presentation on sketches. An example of SAs with cadastral municipalities and local communities is represented in Figure 1.

21. The number of households for urban territories and the number of households and area of agricultural land for non-urban areas are criteria used in the definition of SA Network in the following manner:

For urban areas:

- below 50 000 inhabitants, a SA is defined for every 300 households;
- 50 000 and more inhabitants, a SA may comprise no more than 1,000 households.

For non-urban (rural and other) areas:

Number of households in settlement	Number of Statistical Areas in agricultural areas in hectares				
	below 1 500	below 2 100	below 3 200	below 4 500	below 6 000
below 100	1	2	3	4	5
below 200	2	3	4	5	6
below 300	3	4	5	6	7
below 400	4	5	6	7	8
below 500	5	6	7	8	9

23. The number of households, type of settlement, terrain configuration and time needed to complete census activity are criteria for the breakdown of SAs into EAs. Depending on the settlement type, the following number of households per EA is methodologically determined:

▪ rural scattered and dispersed settlement	50 households
▪ rural compact-streetlike settlement	75 households
▪ sub-urban settlements and peripheral parts of urban settlements	90 households
▪ urban settlements	100 households

24. The border descriptions of EAs are worked out on KSK-4P forms, graphical presentation of borders on scales 1: 500, 1: 1 000 for urban areas and 1: 2 500 for non-urban areas. Figure 2 represents a sketch of urban EA.

25. The satisfactorily defined border description and adequately updated sketch of an EA allows the enumerator to easily identify the borders of an area assigned to him, to correctly count all statistical units belonging to this area, to avoid any possible double counting or non-coverage of enumeration units. In order to simplify the orientation of enumerators in the field to the greatest extent possible, methodological recommendations suggest that border lines should, where possible, follow natural boundaries such as streets, railway lines, rivers and lake shores, i.e. conspicuous and easily recognizable objects. It is recommended to avoid dragging border lines and to describe them as such if they lay on some unrecognizable object, for example border lines between cadastral municipalities or cadastral parcels.

26. Sketches and border descriptions for all 40,000 EAs have been prepared for the Population, Households and Dwellings Census in 2001. This Census has been postponed to 2002 because the quality of these sketches is not uniform, one of the reasons being that the relevant GIS technology is only in an incipient phase. Figure 2 is an example of an acceptable map of the EA, and it satisfies methodological recommendations.

27. As well as serving as the basic territorial unit for conducting the Census of Population, Households, Dwellings and Agricultural Holdings, an EA is also the basis for determining reporting units for the Household Budget Survey, Labour Force Survey and other sample surveys. In planning large sample surveys of population or households, EAs are taken as primary choice units, and in the second phase elementary units are chosen.

28. An unsettled address system makes it very difficult to define territory, especially in urbanized areas. There are exceptions, of course, with acceptably well-organized and well-run address systems, for example in the City of Belgrade. The Office for Statistics and Informatics of the City of Belgrade runs the Register of Streets and House Numbers, which is connected to all municipal services which are obliged by law to update names of streets and numbers of houses. Also in some municipalities in the Province Vojvodina and in Central Serbia, municipal services run their address system in a classical way but with acceptable updating. However, the fact remains that, before the establishment of an updated, arranged and well-organized address system in the entire Republic of Serbia (FR Yugoslavia), it will not be possible to create a secure and reliable RTU. This implies that not only would the RTU be non-secure and of low quality, but other registers and public evidence in the state would be unusable, or even not established at all, e.g. the Central Register of Population, or the Register of Houses and Dwellings. This is the reason why information from other registers (Register of Classification Units, Central Register of Shops) which are run by the Statistical Office of Serbia is not always of good quality.

ENUMERATION AREA MAP

Republic SERBIA
 Town BELGRADE
 Municipality NEW BELGRADE
 Settlement BELGRADE - PART
 Cadastral municipality NEW BELGRADE

Settlement IN 791067
 Cadastral Municipality IN 716090
 Statistical Area IN 7013060
 Enumeration Area number 27

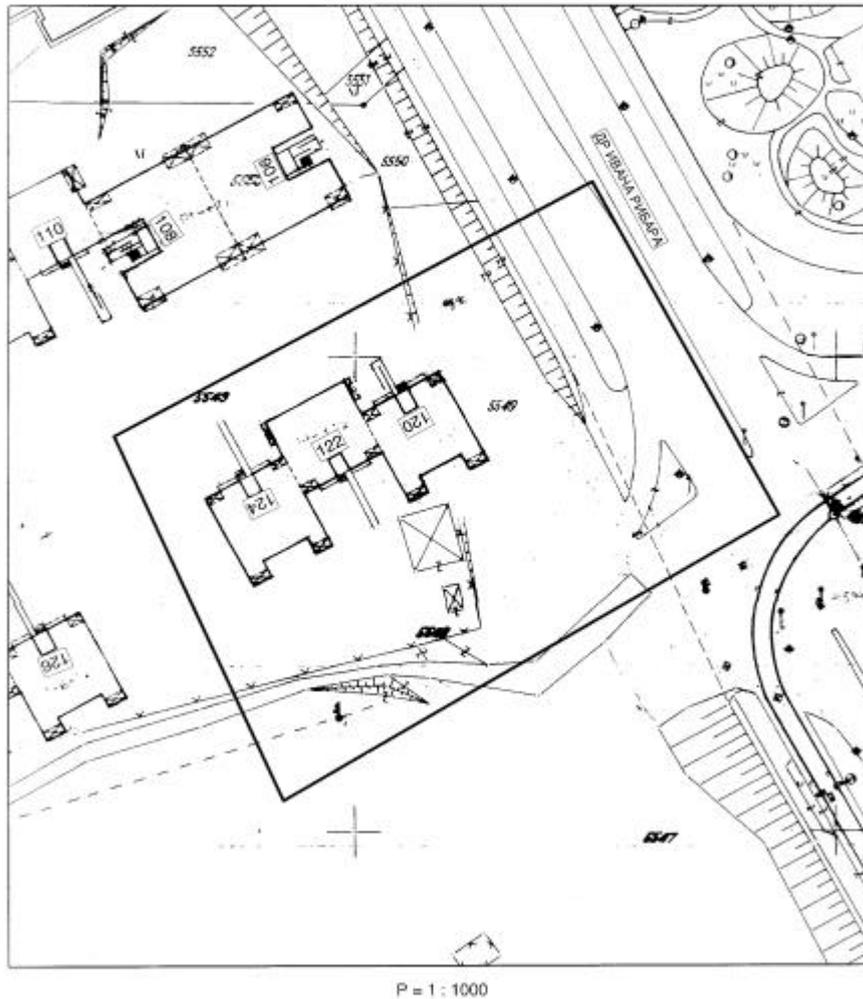


Figure 2. Enumeration Area map (urban settlement, scale 1 : 1000)

29. It is vital that the government (of Serbia or FR Yugoslavia) find and decide upon the most rational solution to this problem as soon as possible, before any implementation of GIS technology can be undertaken in statistics at all levels.

30. Consensus exists of the current possibilities, potentials and advantages of GIS and its implementation in collection, processing and presentation of the results of statistical research in the statistical system of Yugoslavia. The statistical office has at its disposal a vectored chart of settlements of

Yugoslavia based on data from the 1991 Census of Population, but the chart is not trigonometrically exact, i.e. its scale 1 : 500 000 makes it difficult to incorporate it into the system. However, a chart of this quality is usable in the Statistics of FR Yugoslavia and Republic of Serbia because the only activity in the field of GIS is the presentation of statistical data and the publication of thematic charts. In 1998, the Federal Office of Statistics formed a working group that tested various software packages (MapInfo, Geomedia, ESRI ArcInfo). GIS applications with database DB2 were tested and the results obtained in the form of thematic maps were exceptional. Rapid and well-designed, with direct queries to the database, new tables combining existing tables with the vectored chart were obtained. The final result was a thematic map, which is an excellent illustration of the table.

31. A precondition for the geocoding of statistical data is the digitization of all territorial units to the level of streets and house numbers. The Cadastral Office of Serbia, as the organization responsible for the running of graphical presentation of units of RTU, began the digitization of borders of SAs. It is expected that this work will be finished before the beginning of the Population Census in March 2002. However, there are many more tasks to be accomplished before the full implementation of GIS in statistics in Serbia and Yugoslavia can begin. Digitization of all territorial units to the level of house numbers and a modern method of running other existing registers and a number of new registers (which are expected to be introduced in the informatic and statistical system of Serbia) are preconditions for introducing and developing GIS.