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Russian Experience in Geospatial Technologies-based Data Collection and Design of Digital Enumeration Areas*

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Dear Colleagues!

One of the largest statistical surveys in Russia – All-Russia Agricultural Census was conducted in 2006. A lot of preparatory work was done to organize this nationwide event.

All-Russian agricultural census was conducted in order to provide the information for the development of effective agro-industry policy, government programmes on agriculture development and to obtain complete information on the food industry that highly affecting the economic security of the country.

The census programme was developed in compliance with the recommendations of the Food and Agriculture Organization of the United Nations (FAO) and other international organizations. It also was based on the experience of national statistical offices of various countries; as well as special attention was paid to the pecularities of agriculture in the Russian Federation.

Preparation and conduction of the census demanded a serious legal framework. Therefore the Government of the Russian Federation adopted the Federal Law on All-Russia Agricultural Census and Government regulation "On the All-Russia Agricultural Census".
The Government Commission on Agriculture and Fisheries adopted organizational and methodological Census documents:

- Basic methodological and organizational provisions on preparation and conduction of the All-Russia agricultural census 2006
- Methodological instructions on making a list of respondents
- Types of questionnaires for different respondents
- Questionnaire filling instructions by type of respondent
- Census statistical toolkit

Methodological recommendations for the application of statistical sampling were also been developed and approved.

The scale of the census is enormous. Nearly 200,000 enumerators were hired to conduct this census. 136,3 thousands of enumeration districts, 23,4 thousands of trainers, 3,6 thousands coordination points.

In the Russian Federation as a whole was surveyed:

- 59,2 thousand agricultural organizations and enterprises, including private holdings;

- 253,4 thousand peasant households (farms);
- 31,8 thousand individual entrepreneurs;
- 17.9 million private households and other individual farms;
- 80,3 thousand horticultural, kitchen gardens, animal husbandries

The non-response rate was only 0.26% of the total number of agricultural holdings.

This is the first time when as a result of census we got an information on different categories of holdings, their size, number of each category of households, performing or stopped their agricultural activities, by type of horticultural crops and vineyards, by varieties, by number of age and sex groups of livestock and poultry in species or species groups. The agricultural census revealed a number of problems, especially those involving the land use. The census identified the problems connected with registration and use of land. We also faced with lack of documents on land plots used, land survey and other reasons.

Much work is being done on automated data processing of the questionnaires, compilation of the census results and publication preparatory works. The terms of preliminary results publishing — VI quarter 2007 and final results will be available VI quarter 2008.
One of the most important preparatory steps of the All-Russian agricultural census was to provide the census personnel with cartographic materials. The aim was to create GIS-based digital maps. The specialized agencies and organizations were invited to perform this work.

During the preparation of census zoning and routes for enumerators the census maps were produced for the 2000 administrative districts of the Russian Federation. Maps consisted of information layers of cadastral division, hydrography, roads, names of settlements etc. 4200 copies of maps were made.

The statistical bodies were provided with detailed digital and paper cartographic materials for effectiveness and data reliability.

Two types of maps were produced and sent to the local statistical authorities (map 1 and map 2). The digital maps 1 show the number of plots for large and small agricultural census units linked to administrative areas and inventory quarters. Maps 1 formed about 2200 administrative regions of the Russian Federation in bitmap format. The digital maps 2 show the borders of administrative regions and major agricultural units in a bitmap format with an additional high-resolution satellite data layer, which includes agricultural land estimates on nearly 2,000 administrative regions of the Russian Federation.

The work was based on the data received from the agricultural lands monitoring system of the Ministry of Agriculture.

To prepare census maps the following materials were used:

- digital maps;
- cadastral maps and plans for agricultural land in the territories by administrative regions of the Russian Federation, agricultural census enumeration units;

- land regulation projects;
- lists of agricultural census enumeration units on the basis of their location;
- satellite data (remote sensing data)

We should note that the experience of All-Russia agricultural Census 2002 was used for the Agricultural Census. For example we used plans of settlements made during the Population Census.

Created information resources could be grouped by its content and designation in following categories:

- lists of agricultural producers;
- various resolution maps;
- primary data on census results (questionnaires and their electronic presentations); census aggregate information that is to be officially published.

They helped

- to get information on the structure and main characteristics of agricultural production, agricultural land use;
- to improve statistical indicators on agricultural producers monitoring;
- to update data on total population of agricultural producers for sample surveys in the intercensal period;
- to harmonize the Russian agricultural statistics in line with international standards;
- to compile agricultural statistics at municipal level.

The federal information resources developed on the basis of the All-Russian agricultural census results are presented on *slide 1*.

At the preparatory stage of the agricultural census we compiled the lists of agricultural producers. This is very important and labour-consuming process that helps to compile the census frame using different sources.

We identified agricultural producers that were not included in registers and administrative records. Their ratio reached 5,4% for individual entrepreneurs, 1,4 % for small agricultural holdings and 1% for large and medium-sized agricultural holdings. This will help to develop a new frame for the sample surveys on agricultural producers.

The Interagency workgroup was established to update agricultural producers list and develop the methodology.

Compilation of the Agricultural Census database is in progress. On the basis of geographic information technologies we will create a powerful analytical system that provides the opportunity to create multi-dimensional analytical reports (using a online analytical processing data volumes) and visualization of the status/condition of agriculture, taking into account the location of production (up to the district level), that enable managers and analysts to quickly and effectively assess the situation in agriculture and to forecast its development.

Slide 2 shows how GIS will be used for development of information and analysis system.

Unique maps were designed and produced in frameworks of agriculture census preparatory works. Their uniqueness is in the combination of data from remote sensing satellite systems (CRP), with data from other sources available to the various ministries and agencies. The info-spatial uniformity, reliability and digital format for CRP reporting helped us to compile data on large agricultural holdings and arable lands. After that the data was provided to enumerators.

One of the Russian district maps with additional satellite data layer is presented on *slide 3*.

Processability of maps and experience of using maps for censuses helps to effectively analyze and present census results. The maps can also be used during the intercensal period and for support of current statistical surveys.

Expanded access will help users to get information on the production of agricultural products, structure of agriculture, the availability and implementation of the resource potential. This is necessary for reliable forecasts of further development of agriculture and development of economic impacts to increase the effectiveness of agricultural production.

Now we are developing web-portal based on ESRI company's server and GIS technologies. The users will be able to get information about agricultural production indicators, structure of agriculture, existence and development of capacity.

We are also preparing materials for "Atlas of Russia", which includes thematic maps on the basic parameters of census for regions, administrative districts and municipal entities of the Russian Federation.

Preliminary results of agriculture Census for the Kursk region are presented on *slide 4*.

These maps should contain aggregated data on crops, livestock, as well as agricultural lands, to show the distribution of rural producers and specialization of Russian regions.

According to our estimates, Atlas will consist of a hundred or so sheets with maps of Russia and its regions in accordance with the above-mentioned topics.

Creation of open information resources, provision of access to organizations involved in information interaction and further development are the most important social and economical task.

In order to control the census data we should widely use modern technologies — remote sensing, GIS to create paper and digital interactive maps.

Indeed, the most effective tools are the geographic information systems, through which many complex challenges could be dealt with. Among them are challenges in agriculture, including monitoring of agricultural lands, crops monitoring using remote sensing data and the dynamics of crop growth, yields forecast and more.

In order to most effectively apply the results of All-Russian agricultural census and digital cartographic material, it is planned to proceed with the integration of the results of operational and statistical information into a geographic information system that will provide a comparison of remote sensing data and the current statistical information, the visualization of these processes, analysis and forecasting in the industry at a qualitatively new level.

You can see *slide 5* describing the application of information technologies in agriculture, using digital maps and remote sensing method.

The experts and analysts can get only authorized access to GIS and their data, as the information that systems contain is confidential.

Layout map with municipal division in Rostovskaya Oblast is presented on *slide 6*.

It is important to create maps for municipal entities to provide clarity of information materials on the natural and economic entities in municipalities and improve the statutory functions of the municipal administration, including the collection of statistical indicators.

Statistical and other methods of obtaining reliable and independent information from different sources using a single cartographic basis for municipalities to solve not only control, collection and analysis of data, but also the visualization, targeted information.

Clarification of digital cartographic products makes it possible to plan agricultural producers surveys on the basis of agricultural land use data.

The agricultural census provided an opportunity to clarify the picture of the use of arable land in the regions of the Russian Federation.

However, I would like to highlight some land concerning problems identified during the census.

A part of unregistered land map in the Kursk region is presented on slide 7.

There were some inconsistencies between enumeration units' lists of agricultural census, based on various agencies information and preliminary results of data collection and processing. In almost every district there were differences with the Federal Agency of Real Estate Cadastre data. There were also differences in quantitative data on arable lands.

The work on updating the arable lands structure and identifying the owner of the unregistered arable land will identify the information missing in statistical records, as well as let to enhance the quality of census data.

Data on agricultural lands and land plots has been updated recently.
Fields maps of pilot agricultural lands are presented on slide 8.

This year we performed fields mapping in 7 regions of the Russian Federation. Field mapping will bring agricultural lands monitoring to anew level and provide users with reliable information.

Despite the fact that in my report I mentioned problems rather than achievements, I would like to say that Russian agricultural census has become a turning point not only in people minds, but also a breakthrough in the country's economy.

Today development of the agricultural section of the Russia state statistics is more than ever necessary for the development and support of the agrarian policy, a common strategy and tactics for the promotion of medium and long-term agricultural policy in Russia, improvement of the agricultural products competitiveness. This is especially important in view of that fact that Russia has become a member of the UN Food and Agriculture Organization (FAO), and is going to join the World Trade Organization (WTO), which requires open and complete information resources.

Thank you for your attention.