Comprehensive cadastral work as a tool for effective land management through the example of Khabarovsk

A V Vdovenko¹, A A Murasheva², V M Stolyarov², P P Lepekhin² and N V Jukova¹

¹Pacific National University, 136, Tikhookeanskaya str., Khabarovsk, 680035, Russia
²State University of Land Use Planning, 15, Kazakova str., Moscow, 105064, Russia

E-mail: amur2@nln.ru

Abstract. Over the five-year period from 2015 to the present, land surveying, cadastral and appraisal activities in the field of land and property relations have undergone significant changes associated with the merger of two main data bases – the real estate cadastre and the rights register – into a single state real estate register. The so-called "comprehensive cadastral works" gained wide distribution. The article sets forth material that relates to the current state and prospects for the development of integrated cadastral works for updating the database data of the Unified State Register of Real Estate for use in the field of managing territories and real estate objects. The article shows which factors are constraining and which are stimulating, as well as the degree of influence of some factors on the conduct of complex cadastral works in order to identify unused or inefficiently used land plots of real estate to form investment-attractive plots for the effective development of territories. The practical significance lies in the fact that the results of the study can be useful when performing integrated cadastral works.

1. Introduction

At present, the problem of updating cadastral data is particularly acute in connection with the transition to the Unified State Register of Real Estate (USRRE). Information on real estate contained in a single information resource is the basis for planning and development of the territory of any municipality, as well as a necessary condition for the efficient use, turnover and taxation of real estate.

One of the goals of this work is to develop proposals for providing relevant information on the land management system as a result of comprehensive cadastral work - a set of measures that will allow updating the USRRE data on real estate in the study area in a fairly short period of time and at minimal cost, allowing to identify unused territory and determine the prospects for its development.

In the course of work, the role of the Unified state register of real estate in the information support of land management was considered through the example of the city of Khabarovsk. It is determined that one of the main problems affecting the reliability of the USRRE data is poor quality of cadastral information contained in documents that are used to fill the USRRE data [1]. Among the authors who studied the scientific and methodological foundations of integrated cadastral works, we note S.A. Lipski (2015), N.O. Mitrofanova (2015), G.L. Zemlyakova (2014).

2. Materials and methods

During the development of the proposals, the analysis and forecast of the use of integrated cadastral work was performed as a system of measures aimed at improving the management of land resources
and real estate of the municipality, using the methods of correlation-regression and trend analysis, as well as using the balance method based on materials obtained from public sources (reports, reports, statistical material) [2]. As a result of applying these methods, the main problems in the implementation of integrated cadastral works in the territory of the Khabarovsk city were identified and proposals for the development of integrated cadastral works were given.

3. The study of the development of integrated cadastral works in Khabarovsk

During the work, an analysis of the land-resource and investment potential of the city of Khabarovsk was performed. Municipal property of Khabarovsk is an important resource for stimulating investment activity. The following items can be distinguished in the structure of the city’s ownership for investment development: land plots, real estate, property complexes, blocks of shares of enterprises and organizations in which the city acts as a shareholder, as well as unused or inefficiently used land resources, which are the main internal investment resource of city development.

As of January 1, 2019, the total land area of the city of Khabarovsk was 38635 ha, of which: agricultural land - 5101 hectares, forest land - 2282 hectares, water bodies - 8973 hectares, development land - 18757 hectares, under roads 1526 hectares, other lands - 1944 ha (Figure 1).

![Figure 1. Distribution of land in the city of Khabarovsk](image)

As of January 1, 2019, Khabarovsk had 1790 cadastral blocks, 56893 land plots, 36616 capital construction objects. Table 1 shows the dynamics of changes in the number of land plots in Khabarovsk.

A comprehensive solution to the problems of reliability and accuracy of USRRE information, correction of errors in information about real estate objects, determination of the boundaries of free land plots is possible when conducting comprehensive cadastral work in relation to all real estate objects located within one (or several) cadastral blocks [3].

| Date       | Total number of land plots | Land plots whose borders are set | Land plots that previously taken into account (the border is not set) |
|------------|----------------------------|---------------------------------|------------------------------------------------------------------|
| 01.01.2015 | 38082                      | 12249                           | 25833                                                            |
| 01.01.2019 | 56893                      | 37742                           | 24151                                                            |

Integrated cadastral works can be an effective tool to improve the quality of cadastral information, improve land management and increase the investment attractiveness of the territory.
The lack of information on the boundaries of land plots in the USRRE limits the ability of authorized bodies to manage free land plots, since the uncertainty of their borders increases the time needed to prepare documents necessary for making appropriate decisions, which in turn significantly reduces the investment attractiveness of the territory. In addition, the risks of property owners increase due to possible litigation.

As of 2019, the real estate registry of the Khabarovsk Cadastral District contained information on 833,755 capital construction objects, of which buildings, structures, and construction in progress made up 126,462. For 14,964 capital construction objects, information on the boundaries was recorded in the USRRE. Thus, only about 7.6% of capital construction projects are displayed on the public cadastral map [4].

In order for negative phenomena to be weakened as much as possible or to be more systematically controlled, it is necessary to take into account regional specifics in the process of updating and filling in new data, including its economic branch structure and particularities of the social sphere and others. Therefore, the study of trends, factors and conditions that determine the results of the information support of the USRRE databases on the basis of comprehensive cadastral work in a specific region is of not only scientific, but also practical importance - business entities will be able to more reasonably approach business improvement and increase the production of competitive products) [5].

In this work, the goal was to summarize the results of studies that will allow us to formulate the main stages of integrated cadastral work, identify factors that have both positive and negative effects on the results of these works, justify a system of measures and conditions for the development of the use of integrated cadastral works for updating data allowing to ensure the formation of investment-attractive plots for the development of the territory and increase income from the use of land plots and other real estate, as well as allowing to solve economic and social problems of the city development [6].

We believe that the effectiveness of the development of the city correlates with the efficiency of planning and conducting the comprehensive cadastral works. However, it is worth noting that the main stages of the implementation of comprehensive cadastral works (CCW) do not fully correspond to the real situation and do not contain exhaustive mechanisms for the performance of work, and the organizational scheme of management is complicated by such facts as the fact that the CCW is carried out in the presence of an approved land surveying project [7].

In modern practice, land surveying projects are prepared sporadically and only for limited territories subject to redevelopment, usually at the expense and at the initiative of those interested in this. Based on this, we can conclude that land surveying projects exist only for a very small number of settlements or their individual territories. In addition, the legislation does not have requirements for the spatial accuracy of surveying projects and the reliability of the source data used in their preparation, which means that the necessary quality of design decisions is not provided.

Nevertheless, taking into account all of the above, it can be said that measures shall be considered that contribute to a more complete and effective implementation of the CCW. Figure 2 proposes an optimized technological scheme for the implementation of comprehensive cadastral works.

The stages of implementation of CCW can be divided into four groups, presented in Figure 3.

The results of comprehensive cadastral works in an Industrial area are considered through the example of the Khabarovsk city (Figure 4).
Figure 2. Optimized technological scheme for the implementation of comprehensive cadastral works
Figure 3. Stages of comprehensive cadastral works

Figure 4. Stages of implementation of the comprehensive cadastral works
Comprehensive cadastral work was carried out in relation to land plots and capital construction projects located within the boundaries of cadastral blocks 27:23:0050406, 27:23:0050407, 27:23:0050408, 27:23:0050409, 27:23:0050410 (Figure 5 a, b).

Figure 5. a) The location of cadastral blocks; b) the same territory in the city of Khabarovsk before performing comprehensive cadastral works

Figure 5 a, b shows cadastral blocks at the time of the start of comprehensive cadastral works, according to the State real estate cadastre data as of 2017.

Within the established period, the cadastral engineer eliminated the reasons that prevent the implementation of state cadastral registration and (or) state registration of rights specified in article 26 of the Law (article 27 of the Law).

As a result of CCW in cadastral blocks 27:23:0050406, 27:23:0050407, 27:23:0050408, 27:23:0050409, 27:23:0050410 a registry error was corrected in relation to 3 land plots, the location of the borders of 69 land plots was clarified, and the borders of 97 capital construction projects were established (Figure 6).

Taking into account the considered practice the following rules are formulated on the example of the city of Khabarovsk to ensure the effective performance of comprehensive cadastral works:

– a clear definition of the goals, including primary and secondary, for comprehensive cadastral works, as well as setting the tasks to be solved, grouped into spatial, legal and economic.

– clear definition of the sequence of stages and content of work, based on a rational practice-oriented approach;

– detailed methodological study of all stages, groups and individual tasks, which is a prerequisite for ensuring a unified approach to the implementation of comprehensive cadastral works on the entire territory of the Russian Federation;

– using up-to-date information from the Unified State Register of Real Estate [8].
Figure 6. The same territory in Khabarovsk after performing comprehensive cadastral works

We believe that the implementation of comprehensive cadastral works also allows us to ensure an increase in budget revenues from property taxes of organizations and individuals. The reason for the increase in land tax is an increase in the cadastral value. Figure 7 a, b shows the analysis of changes in the cadastral value of land plots after comprehensive cadastral works in cadastral blocks 27: 23: 0050406 and 27:23:0050409.

Figure 7. Graph comparing the cadastral value of land in cadastral blocks: a) 27: 23: 0050406; b) 27: 23: 0050409

Thus, we can conclude that according to the graphs, the cadastral value of land plots has changed upwards.
It follows that the amount of land tax will also increase significantly. Basically, the cadastral value has increased due to the formation of new land plots, increasing the area and changing the type of permitted use [9].

Based on our research, we have proposed an algorithm for implementing the results of CCW for land plots, capital construction projects, and what is especially important – for objects of urban planning regulation. As in the course of complex cadastral works, among other things, the types of permitted use of land plots are specified. Conducting comprehensive cadastral works also helps clarify spatial planning, territorial zoning and types of permitted use. We consider it necessary, based on the results of the comprehensive cadastral work, to amend both theUSRRE and the territorial planning documents (Master Plan, Land Use and Development Rules) to clarify the types of permitted use of land and specify the boundaries of territorial zones [10].

The algorithm for the implementation of the results of comprehensive cadastral works for urban development objects is presented in table 2.

**Table 2. Algorithm for implementing the results of comprehensive cadastral works for land plots**

| Situation                                      | In real space | In registries | Land plots                                      |
|------------------------------------------------|---------------|---------------|------------------------------------------------|
|                                                | Spatial       | Legal         | Urban Development Information Systems          |
|                                                | Economic      |               | USRRE                                          |
|                                                |               |               | Federal Information System                    |
|                                                |               |               |                                                |
| Formation (legal registration) of an existing land plot | Establishment of boundaries, cadastral survey | Cadastral value calculation | Recognition (confirmation) of land rights | Monitoring the compliance of the land plot with urban planning requirements | Cadastral registration | Adding information to the tax registry |
|                                                |               |               |                                                |                                                |                                                |
| Calculating the area of a land plot            |               |               | Obtaining the cadastral passport               | Establishing the Type of Permitted Use         |                                                |
|                                                |               |               |                                                |                                                |                                                |
| Obtaining the certificate of ownership         |               |               | Adding updated information about a land plot   | Registration of rights                         |                                                |
|                                                |               |               |                                                |                                                |                                                |
| Clarification of information on the existing (previously recorded) land plot | Clarification of information on the boundaries of the land plot | Cadastral value recalculation | Obtaining the cadastral passport | Adding updated information about a land plot | Cadastral registration of changes due to clarification | Adding the revised information to the tax registry |
|                                                |               |               |                                                |                                                |                                                |
| Calculating the revised area of land           |               |               | Obtaining the certificate of ownership         |                                                |                                                |
|                                                |               |               |                                                |                                                |                                                |
| Elimination of cadastral errors (border crossings) | Clarification of information on the boundaries of the land plot | Cadastral value recalculation | Obtaining the cadastral passport | Adding updated information about a land plot | Cadastral registration of changes due to clarification | Adding the revised information to the tax registry |
|                                                |               |               |                                                |                                                |                                                |
| Calculating the revised area of land           |               |               | Obtaining the certificate of ownership         |                                                |                                                |
|                                                |               |               |                                                |                                                |                                                |


4. Conclusion

Land management is a systematic, conscious, purposeful effect that the State and society have on land resources. The basis of the land management system is formed by the object, subject, purpose, tasks and functions of management.

Implementation of an effective land policy is impossible without the formation of data on urban registration of real estate, the development of a monitoring system and land accounting after delimiting State ownership of land.

Integral indicators of the socio-economic state of the Khabarovsk city indicate its relatively high investment rating among other subjects of the Khabarovsk Territory. Comprehensive cadastral works are one of the factors to increase the investment attractiveness of the regional center - Khabarovsk.

The main problem affecting the reliability of the Unified State Real Estate Register (USRRE) information is the low quality of cadastral information contained in the documents on the basis of which the cadaster was filled with information about real estate.

Given that the funds for the work are attracted from the consolidated budget of the subject of the federation, and these costs should not only be recouped, but also become highly profitable as a result of the comprehensive cadastral work.

On the example of the analysis of the results of the CCW performed on the territory of the Khabarovsk Territory, we can say that the main stages of the implementation of the CCW do not fully correspond to the real situation and do not carry sufficient mechanisms for performing the work. Land surveying projects exist only for a very small number of settlements or their individual territories. In addition, the legislation does not have requirements for the spatial accuracy of surveying projects and the reliability of the source data used in their preparation, which means that the required quality of design decisions in their composition is not provided.

Based on the analysis, an optimized technological scheme for the implementation of comprehensive cadastral works is proposed.

CCW was conducted in cadastral blocks 27:23:0050406, 27:23:0050407, 27:23:0050408, 27:23:0050409, 27:23:0050410 of Khabarovsk, as a result of which a registry error was corrected for 3 land plots, the location of the borders of 69 land plots was clarified and the borders of 97 capital construction objects were established.

The analysis of changes in the cadastral value of land after comprehensive cadastral works. The cadastral value of land after the CCW has changed upward. From this it follows that the amount of land tax will also increase significantly. Basically, the cadastral value increased due to the formation of new land plots, an increase in the area and changes in the type of permitted use.

An algorithm is proposed for implementing the results of comprehensive cadastral work for land plots, capital construction projects, and urban planning regulation objects. The role of CCW in updating the territorial planning documents is disclosed.

To ensure the effective implementation of comprehensive cadastral work, a clear definition of the goals of the CCW, a clear definition of the sequence of stages of the CCW, as well as the use of relevant information from the USRRE are necessary.

References

[1] Vdovenko A V and Lepyavko A V 2018 Information support for the Unified State Register of Real Estate Electronic scientific publication Scientific notes of PNU 9(1) 347-351
[2] Murasheva A A 2006 Theory and methods for the formation of the information mechanism of environmental management in the region (on the example of Far Eastern Federal District) (Moscow: State University of Land Use Planning)
[3] Lepekhin P P and Murasheva A A 2015 Information-modeling system for solving regional environmental problems Earth Sciences 1 24-32
[4] Kustysheva I N and Ostarkova D A 2018 Implementation of the Far Eastern Hectare program as a way to develop the territory of the Far East International Agricultural Journal 2 69-71
[5] Xu H 2014 Modification of Normalised Difference Water Index (NDWI) to Enhance Open Water Features in Remotely Sensed Imagery Int. J. of Remote Sensing 27(14) 3025-3033

[6] Egidarev E G 2014 Evaluation of the environmental impact of placer gold mining in the Amur River basin Geoecology, engineering geology, hydrogeology, geocryology 5 429-441

[7] Lipski S A 2015 Complex cadastral works as a necessary step aimed at regulation of relations in the sphere of immovable property Real estate legal questions 1 25-28

[8] Mitrofanova N O 2015 Integrated cadastral works from a practical point of view Letters of higher educational institutions. Geodesy and aerial photography S5 86-90

[9] Zemlyakova G L 2014 Prospects for the development of cadastral registration of land plots legislation Modern law 7 92-98

[10] Izotov D A 2017 Far East: innovations in public policy IVF 4 27-44