Principles of cadastral valuation and usage of water reservoirs in the Republic of Kalmykia

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Abstract. The article deals with the principles of the cadastral valuation in the area of water reservoir construction site. Rules of using water resources, technical maintenance and water reservoir improvement are given. Special attention is paid to the land-use planning in the area of the water reservoir construction. Basing on the results of the pre-design and land-use planning, a number of land plots and active areas of water utilization scheme and participants who receive profit from the water reservoir have been determined. These data can be used to determine the cadastral value and the land tax.

1. Introduction
During national cadastral valuation estimated area zoning is fulfilled. An estimative zone is a part of lands similar for the intended purpose, type of the pragmatic use, and close in cadastral value land plots. Depending on the territorial value of the estimated zones their boundaries coincide with the land plots boundaries with the account of the existing development and land utilization, linear type facilities, as well as with the boundaries of cadastral districts or blocks. A map (scheme) of estimative zones is done on the results of the evaluation and a cadastral value of the area unit is established within the zones boundaries.

2. Problem
There are following water reservoirs in the Republic of Kalmykia: Arshan-Zelmen, Gorodovikovskoe, Lagansko, Nugra, Proletarsko, Ulan-Erginskoe, and CHograiskoe. The total area of the flood land in the Republic of Kalmykia is 1231980 ha. There are 37 water inlets on the area of Ketchenerovskogo, Maloderbetovskogo, Oktiabrskogo, Sarpinskogo, TSelinnogo, IUstinskogo, Iki-Burulskogo, IAshkulskogo, and Priiutnenskogo regions. 8 water reservoirs were built in 2011, and Elistinskoe is one of them. Its water will be used for irrigating agricultural lands, and there will be a tourist-recreation site on its banks. The water reservoir is 14 km away from Elista, in the Gashun-Sala Clough. Its area is about 600 ha, its useful storage is 35 mln m³ of water. The characteristic levels and storages of the water reservoir are in figure 1 [1].

These project is important for the steep region as Kalmykia has little water sources especially in the central part of the republic.

Water storage usage must be done according to the rules of water resources utilization and rules of engineering instruction and water reservoir improvement by the Decree of the Government of the Russian Federation on 22 April 2009 no. 349 [2–4].
Water will be taken from the CHernozemelskii irrigation channel by the underground method. A pump house is built for this. It will feed water through the water-pipe. Besides, the facility includes the cutting-off dam and dike 19 m high (fig. 2, 3).

![Figure 1](image1.png)

**Figure 1.** Characteristic levels and reservoir capacities.
NDL is the highest banked-up water level, which the dyke can perennialize at normal operation of all facilities;
FDL is the highest banked-up water level which can be held for a short time during flood routing for the safety of the facilities;
MSL is the minimal permissible level in a normal operating environment.

![Figure 2](image2.png)

**Figure 2.** Early works (a) – site preparation for the construction of Elistinskii water reservoir; (b) – bottom solidifying works at Elistinskii water reservoir.

![Figure 3](image3.png)

**Figure 3.** Elements of the water supply system to the water reservoir: (a) – Elistinskii water reservoir dam; (b) – Elistinskii water reservoir pipe.
3. Materials and methods
While constructing water reservoirs vast lands are flooded that is why they are reserved for state needs. Lands can be reserved for state needs not more than for 7 years [5, 6], and the state cadastral valuation of lands must be done once in 5 years [7].

Land use planning must be done on the water reservoir construction site before it has been built [8, 9]. Succession of works at local land management for water reservoir construction is given in works by S.N. Volkov [10]:

- The location of all lands affected by the water reservoir and waterworks facilities is determined, their boundaries with households/farms and flood zones, underflood, shallow waters, construction sites etc. Distribution of the water reservoir itself which takes the main part of the granted lands is determined within the flood boundaries (on the flood level), which are on the project plans in scales 1:25 000 or 1:10 000, land plots are marked which are taken by the water reservoir and hydroelectric generating station. Possible rincons are determined as well as their economic use.
- The areas are calculated (total and agricultural) and explications are made to every landed property (land-use) after determining the boundaries of the granted lands (flooding level). Project explications are done by the land categories for every region, subject of Federation and the water reservoir itself.
- Plot on the boundaries of the flooded lands on the project plans which are not excluded from the landed property (land-use). New construction is prohibited there; the character of the agricultural land-use is changed as well as their productivity. The area of the flooded lands is calculated in the project explication. The area of every land-plot (land-use) is calculated and the project explications of the rest of lands are done.
- The location of the populated areas of industrial centers, bridges, roads, communication lines and other objects which cannot be located at the former area due to flooding, underflood, bank erosion, landslides, worse malaris conditions, institutionally-managemental reasons is impossible or loses their commercial value. It is decided whether it is necessary to protect some objects. Shallow waters, their boundaries and areas are determined. The issue of their economic use or engineering protection is solved according to the construction rules 104.13330.2016 [11].
- The economic loss for the land owners, land users and land lords is determined. When the economic loss is determined due to early termination of their obligations to the third parties, work costs for land rehabilitation, lost profits are calculated. For land lords – the rent payment for rent lease for the period after withholding the land plot, the right cost for the rent lease of the land plot at the market.
- Proposals are made for the removal and use of the fertile soil layer on flooded areas for the operational project.
- The proposals are made for major conditions of the land grant. They are: reconstruction of the affected transport links, measures to protect natural resources and the environment, cultural and historical objects protection, determining the terms of water reservoir resources use and so on.
- The proposals are made to reorganize existing land-property (land-use), manufactures, resettlement, and their costs. Here flooding and underflood of agricultural lands and settlements is taken into account, as well as disjointedness of the land properties and land-uses.

4. Results discussion
The data received during the pre-design and land use planning allow determining the number and used areas of the water utilization system parts, who receive the profit from the water reservoir and make their evaluation. Area data can be used to calculate the cadastral value and the land tax.

The flooded area is mostly covered with agricultural lands, that is why the specific indicator of the cadastral value, used for calculations on this kind of water utilization is equal to the average value of the specific indicators of the agricultural land value for administrative areas where the waterworks facilities are placed. The indicators for every region are given in table 1.
Table 1. Specific indicators of the cadastre values of the agriculture lands in the flooded municipal regions

| name of the region      | Specific indicator of the land cadastre values, rub/ha |
|-------------------------|--------------------------------------------------------|
| Ketchenerovskii        | 669.60                                                 |
| Maloderbetovskii       | 1630.63                                                |
| Okt’ab’r’skii          | 427.27                                                 |
| Sarpinskii             | 3681.47                                                |
| Tselinnyi              | 4091.44                                                |
| Ustinskii              | 421.73                                                 |
| Iki-Burulskii          | 2195.75                                                |
| Yashkulskii            | 640.60                                                 |

The average specific indicator of the cadastre land value, rub./ha 1719.81

State cadastre evaluation of lands is done to determine the cadastre value of the land plots for different purposes. Cadastre value is the market cost of the property determined during the state cadastre evaluation the method of mass evaluation, or the market cost, determined for every object individually when it is impossible to determine the market cost by mass methods [12]. When determining cadastre value the objects of evaluation are property objects enlisted in the State Immovable Property Cadastre on the date of cadastre evaluation.

Land evaluation is done with the account of land, city-planning, forest, water and other cadastres [13]. It results are registered in the register or classified code of data on the registered immovable property (land plots, buildings, constructions, unfinished objects and buildings), as well as data on the State Boundary of the Russian Federation, and boundaries between the subjects of the Russian Federation, municipal boundaries, boundaries of population areas, target areas and use-restricted zones.

5. Conclusion
It has been determined that during utilization the Elistinskii water reservoir will further turn into the complex of hydro technical facilities for systematic contentment of the requirements of all parts of the water resources utilization system. It is conditioned by the deficit of water resources in the Republic of Kalmykia.

Land resources and water objects need systematic and regular quality and quantity classification. Here special attention should be paid to the changes in the ameliorative state of lands, the groundwater depth level, as well as indicating of changes in the object cost.

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