State land monitoring and its regional aspects

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Abstract. The state land monitoring in the territory of the Kachugsky and Shelekhovsky districts of the Irkutsk region revealed the development of negative processes of natural and anthropogenic nature. The conducted research revealed the distribution areas of water erosion over the entire area of the districts. Significant territories are subject to such negative natural processes as waterlogging, swamping, and flooding. Burnt areas and industrial forest use are the most widespread among negative processes of an anthropogenic nature. The obtained relevant information based on the research results can contribute to the adoption of effective management decisions to prevent the deterioration of land condition.

The most important aspect of the state land monitoring, provided for by Russian legislation, is to obtain reliable data on the current land condition for effective land management in terms of rational land use [1, 2, 3]. The spread of negative processes of a natural and anthropogenic nature leads to a deterioration in the land condition [4, 5, 6, 7]. The obtained actual data of the state land monitoring make it possible to prevent the development of negative processes [8, 9, 10]. The purpose of the research is to study the regional aspects of state land monitoring. The task is to identify the development of negative processes of a natural and anthropogenic nature in the territories of the Kachugsky and Shelekhovsky districts of the Irkutsk region. The lands of the Kachugsky and Shelekhovsky districts of the Irkutsk region were selected as the object of the research. Methods of information analysis and statistical processing were used for the research.

According to the regional report "On the state and use of the lands of the Irkutsk region in 2019" of the Office of the Federal Service for State Registration, Cadastre and Cartography in the Irkutsk Region, state monitoring of lands was carried out in the territories of the Kachugsky and Shelekhovsky districts. During the state monitoring on the territory of the Kachugsky district, the development of negative processes of natural and anthropogenic origin was revealed. The area subject to development of negative processes occupies almost the entire territory of the district - 3070.6569 thousand hectares or 97.76%. About 80% of the surveyed lands are subject to negative natural processes (table 1).
| №  | Negative processes                  | Area, occupied by negative processes, th.ha. | % of total area of the district | % of total area of development of negative processes | Degree of development of negative processes,% |
|----|------------------------------------|--------------------------------------------|--------------------------------|-----------------------------------------------------|---------------------------------------------|
| 1  | Negative natural processes         | 2482.4761                                  | 79.03                          |                                                     |                                             |
| 1.1| Water erosion                      | 1913.7225                                  | 60.93                          | 62.32                                               | 35.51, 55.43, 9.06                         |
| 1.2| Waterlogging                       | 367.9032                                   | 11.71                          | 11.98                                               | 47.35, 41.72, 10.93                        |
| 1.3| Flooding                           | 51.2228                                    | 1.63                           | 1.67                                                | 77.93, 22.07, -                            |
| 1.4| Swamping                           | 125.6258                                   | 4                              | 4.09                                                | 45.03, 4.75, 50.22                         |
| 1.5| Landslide and talus processes      | 24.0018                                    | 0.76                           | 0.78                                                | 32.25, 67.75, -                            |
| 2  | Negative anthropogenic processes   | 588.1808                                   | 18.721                         |                                                     |                                             |
| 2.1| Subsoil use areas                  | 0.406                                      | 0.01                           | 0.01                                                | -                                           |
| 2.2| Industrial forest management       | 64.7046                                    | 2.06                           | 2.11                                                | -                                           |
| 2.3| Areas for storage and disposal of  | 0.0247                                     | 0.001                          | 0.001                                               | -                                           |
|    | industrial waste and land pollution|                                            |                                |                                                     |                                             |
| 2.4| Burnt areas                        | 523.0455                                   | 16.65                          | 17.03                                               | -                                           |

At the same time, the overwhelming area of land covered by the development of negative processes is subject to water erosion - almost three quarters of the district's territory. At the same time, more than 50% of the spread was of moderate erosion and more than a third of weak erosion on large sloping and slightly sloping slopes.

Large areas are subject to waterlogging processes, which are spread in low relief forms. These negative processes are mainly manifested in a weak and medium degree, accounting for more than 41%.

Flooding is also widespread on the lands of the region in low floodplains. This negative process covers about 2% of the territory. Mostly the degree of flooding is low, accounting for about 80%. The average degree of development of this negative process accounts for about a quarter, the strong one is absent. A low degree of flooding is common in floodplains of large and small rivers, as well as streams that are not subject to flooding during periods of floods and floods. River floodplains with small length and width are subject to moderate flooding.

Most of the area's land - 125.6258 thousand hectares, 4% of the total area of development of negative processes is subject to swamping. More than 45% of the land is subject to this negative process to a weak extent. It should be noted that more than 50% is accounted for by a strong degree of swamping development.

Landslide and talus processes occupy small areas of the territory of the region on steep slopes. The degree of development of this negative process is predominantly average and is about 70%. A weak degree of development of the process accounts for more than a third, a strong one is absent.

Negative anthropogenic processes are moderately widespread, accounting for about 19%. Fumes occupy the largest area of anthropogenic character - about 17%. This type of negative processes is formed as a result of extreme natural and anthropogenic phenomena.

Industrial forest management areas cover 7.5%. Other types of negative anthropogenic processes occupy an insignificant part of the territory of the Kachugsky region.
Carrying out state monitoring on the lands of the Shelekhovsky district revealed the development of negative processes of a natural and anthropogenic nature also almost throughout the entire territory. Thus, negative processes occupy 193,162.3 thousand hectares or 95.6% of the land. The largest area of the region is subject to water erosion, which develops on areas of sloping and slightly sloping slopes. Water erosion occupies about 80% of the area of the region and 83.5% of the total area of development of negative processes (table 2).

Table 2. Negative processes on the lands of the Shelekhovsky district.

| № | Negative processes | Area occupied by negative processes, th.ha. | % of total area of the district | % of total area of development of negative processes | Degree of development of negative processes, % |
|---|---------------------|---------------------------------------------|-------------------------------|---------------------------------------------------|---------------------------------------------|
| 1 | Negative natural processes | 172,9116 | 79.82 | 83.5 | 70.9 | 6.29 | 22.81 |
| 1.1 | Water erosion | 161,294 | | | 36.91 | 49.10 | 13.99 |
| 1.2 | Waterlogging | 5,0863 | 2.52 | 2.63 | 88.15 | 11.85 | - |
| 1.3 | Flooding | 5,2963 | 2.62 | 2.74 | 100 | - | - |
| 1.4 | Swamping | 0.6992 | 0.35 | 0.36 | 90.13 | 9.87 | - |
| 1.5 | Landslide and talus processes | 0.5358 | 0.27 | 0.28 | - | - | - |
| 2 | Negative anthropogenic processes | 20,2507 | 10.02 | | | | |
| 2.1 | Subsoil use areas | 0.9234 | 0.46 | 0.48 | - | - | - |
| 2.2 | Industrial forest management | 15,1572 | 7.5 | 7.85 | - | - | - |
| 2.3 | Areas for storage and disposal of industrial waste and land pollution | 0.1282 | 0.06 | 0.07 | - | - | - |
| 2.4 | Burnt areas | 3.8881 | 1.92 | 2.01 | - | - | - |
| 2.5 | Land construction sites | 0.1538 | 0.08 | 0.08 | - | - | - |

Water erosion of a low degree is predominantly present, however, about a quarter of the territory is occupied by a strong degree.

The study area contains significant areas - more than 5 thousand hectares, subject to the process of waterlogging in low relief forms. At the same time, a strong degree of development of waterlogging occupies about half of the area, a weak degree is characteristic of more than a third of the total area of development of this negative process.

Flooding processes occupy almost the same area of more than 5 thousand hectares. A large area is occupied by a weak degree of development of this process - over 88% of the territory. The average degree of development is more than 11%. The floodplain areas - в меньшей степени of large rivers that are least susceptible to flooding during periods of freshets and melting floods, as well as floodplains of small streams and rivers, are less prone to a weak degree. The floodplains of the rivers of medium length and width are prone to an average degree of development of flooding.

The negative process of swamping occupies an insignificant area with a weak degree of development. Areas of swamping are found in low areas of river and stream valleys, as well as in closed depressions of the terrain.

Landslide and talus processes are present on steep slopes to a weak degree on 90% of the total area of development of this negative process.
Negative anthropogenic processes are also moderately widespread in the region, occupying 20% of the area. Negative anthropogenic processes spread as a result of industrial activities and fires. In most cases, this is industrial forestry, as well as burning. Less than 1% of the district's territory has been identified areas of subsoil use, storage and disposal of industrial waste and land pollution, areas of ground construction.

Thus, as a result of the study, based on the results of state monitoring of the lands of the Kachugsky and Shelekhovsky districts of the Irkutsk region, the development of the following natural and anthropogenic negative processes was revealed:

- almost the entire area of the studied territories is subject to the development of the process of water erosion, mainly of weak and medium degrees of development as a result of the downhill and slightly downhill terrain;
- in the districts, a significant area is occupied by waterlogging of a weak and medium degree, swamping is weak, there is flooding in low and closed areas of the terrain, insignificant landslide and talus processes of a weak degree - on steep slopes;
- negative processes of an anthropogenic nature in the territories of districts occur as a result of fires and industrial forest management, mining, storage and disposal of industrial waste, as well as construction.

The development of negative processes of natural and anthropogenic nature worsens the land condition. The information obtained as a result of the conducted research can contribute to the adoption of effective management decisions by state and local authorities to prevent further development of the identified negative processes.

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