



III International Scientific Conference “Sustainable and efficient use  
of energy, water and natural resources – SEWAN-2021”

ГАЛАХИМ



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## **Title: Assessment of the carbon budget in managed forests of the Far Eastern Federal District, evidence from the Khabarovsky Krai**

**Authors: D.A. Golubev, D.V. Izotov, N.K. Rastanina,  
K.A. Kolobanov, M.Yu. Filatova**

**Affiliations: Far East Forestry Research Institute  
Pacific National University**

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**Keywords:**

Carbon budget, Forest fires, Growing stock, Reclamation

**Research Objective: Estimation of the carbon budget in the managed forests of the study area for the development of CO<sub>2</sub> emissions into the air.**

**Relevance: The Paris Agreement [1], signed by 195 countries, including the Russian Federation on April 22, 2016, provides for the mandatory implementation of measures to reduce greenhouse gas emissions (including carbon dioxide) into the atmosphere. Carbon dioxide, according to the latest research, is a major cause of climate change, especially from the burning of fossil fuels. Against the background of climate change, the Strategy for the Environmental Development of the Russian Federation notes trends in the reduction of species biological diversity and deterioration in the quality of the environment.**

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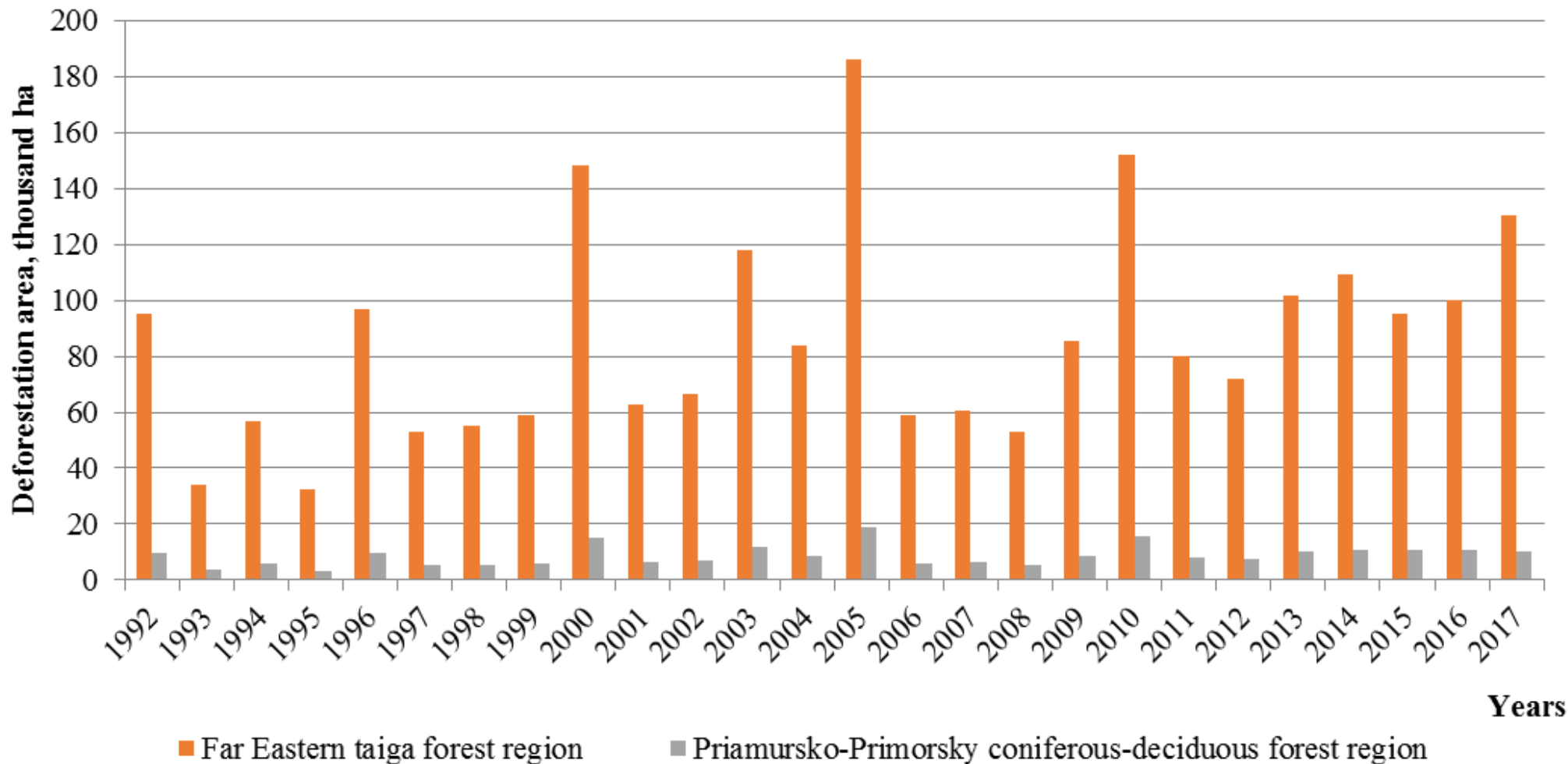
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## Areas of dead forest plantations in the studied forest areas of the Far Eastern Federal District



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## Areas of dead plantings for various reasons

Subject	Dead plantings	including for reasons, ha					
		Forest fires	insect damage	weather conditions and soil and climatic factors	forest diseases	damage by wild animals	anthropogenic factors
Primorsky Krai	93 686,81	89 885,6	76,0	569,20	3 149,49	0	6,52
Khabarovsk Krai	100 155,09	88 967,5	651,9	1 609,81	8 907,44	0	18,44
Sakhalin Region	15 201,36	4 425,7	0	1 646,48	9 110,32	0	18,86
Amur region	109 507,33	98 406,0	0	1 696,24	9 385,66	0	19,43
Magadan Region	14 405,74	6 898,2	0	1 147,12	6 347,28	0	13,14
Jewish Autonomous Region	54 488,14	44 396,7	298,5	1 496,32	8 279,48	0	17,14
Total	387 444,47	332979,7	1 026,40	8 165,17	45 179,67	0	93,53

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## Objects and research methods

The study of carbon losses in managed forests of the Far Eastern Federal District (on the example of the Khabarovsk Krai) was carried out using the program of the Regional Forest Carbon Budget Assessment (ROBUL ) [2].

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# Khabarovsk Krai

- 47 forestry
- The area of forests on the lands of the forest fund is 73 734.2 thousand ha
- Growing stock 5046.08 million m<sup>3</sup>
- 18% of the forested area of the Far Eastern Federal District
- 25% of the timber reserves of the Far Eastern Federal District
- Forest cover - 66.5%
- 6 state nature reserves
- 2 national parks
- 5 nature reserves
- 99 protected areas of regional importance
- 82 - local importance
- The main rocks of the region:
- Daurian larch and Ayan spruce.



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## Causes of fires

**60% - from anthropogenic sources of fire, mainly due to the fault of the local population.**

**40% - from thunderstorms, mainly in hard-to-reach areas**

**Lands intended for reforestation after forest fires: 3366.3 thousand hectares.**

**Recultivated: 177.2 thousand hectares.**

**At the same time, in the current Forest Plan, measures for reforestation in the amount of 606.5 thousand hectares are planned at the expense of persons using forests, and measures for afforestation and land reclamation for 2019-2028. not planned.**

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## Data on the content and loss of carbon in the Khabarovsk Krai

Pool of carbon	Carbon stock, t C	Carbon absorption, t C year <sup>-1</sup>	Losses of carbon from fires, t C year <sup>-1</sup>	Carbon losses from felling, t C year <sup>-1</sup>	Carbon budget, t C year <sup>-1</sup>
Stand biomass	2 097 619 145	16 255 599	-11 274 568	-2 045 646	2 935 385
Dead wood	366 262 908	2 004 813	-1 968 640	-357 188	-321 014
Forest litter	325 365 341	559 409	-603 342	-109 470	-153 403
Soil (0-30 cm)	5 053 137 223	3 171 617	-3 286 395	-596 280	-711 058
Total	7 842 384 616	21 991 439	-17 132 944	-3 108 584	1 749 910



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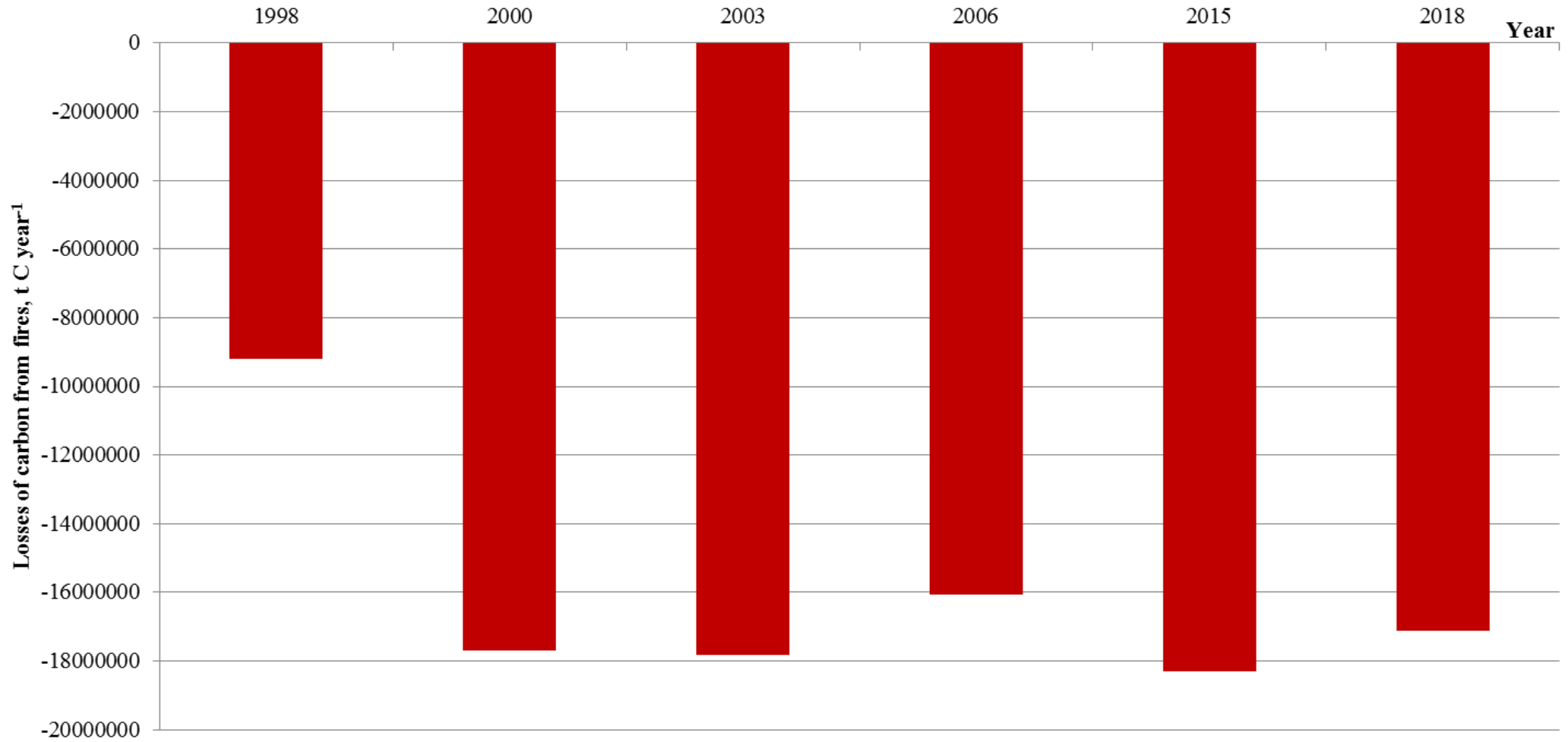
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# Dynamics of carbon losses from forest fires in the Khabarovsk Krai



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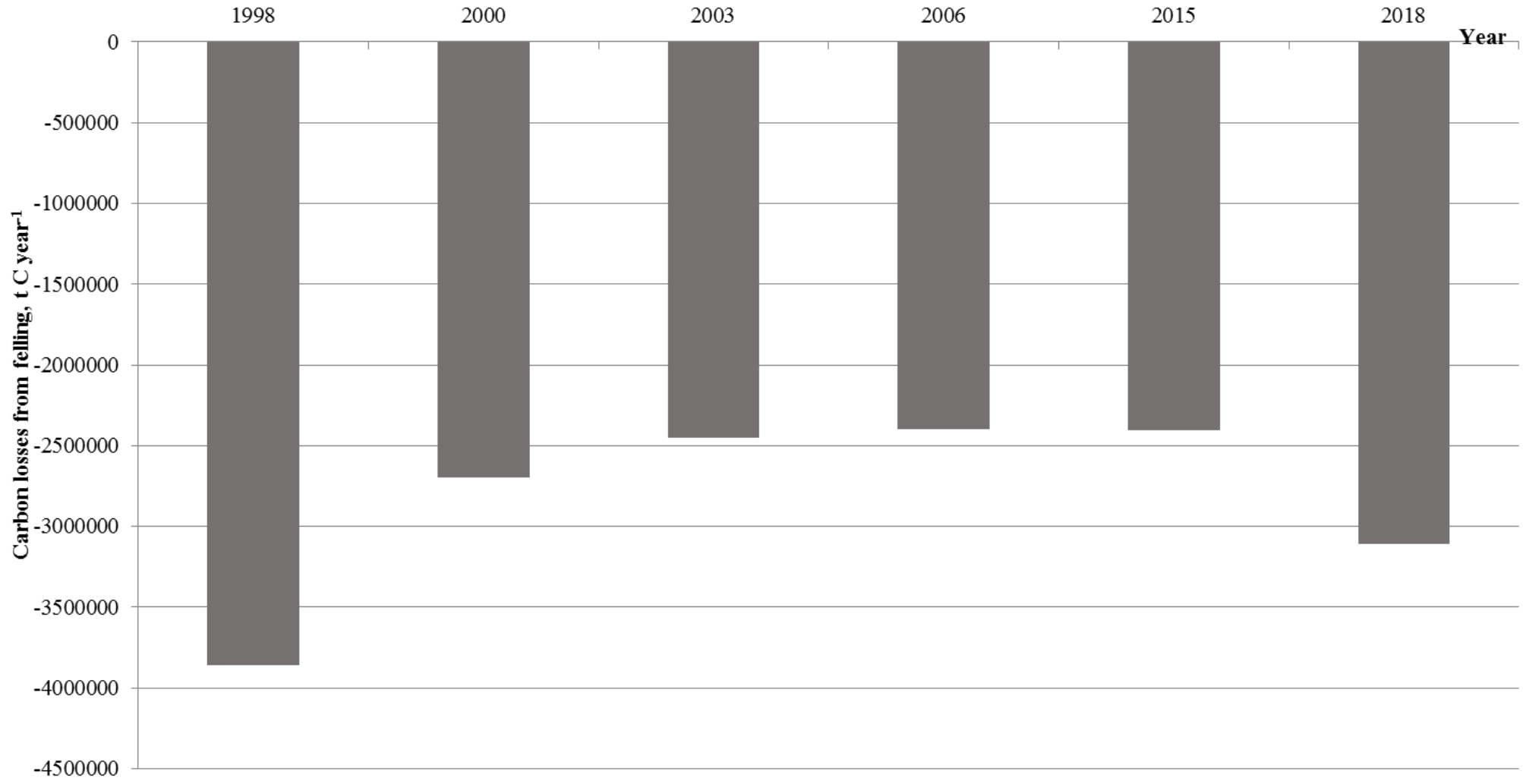
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# Dynamics of carbon losses from felling in the Khabarovsk Krai



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Name of forest protection measures	Actual volume of implementation for 2018	Planned volume of implementation for 2028
Installation and placement of stands, pcs	997	1 030
Improvement of recreation areas, pcs	782	963
Installation and operation of barriers, device of barriers, pcs	585	289
Construction of forest roads, km	2 214.1	740
Reconstruction of forest roads, km	5 975.8	6 500
Construction, reconstruction, operation of landing sites for aircraft / helicopters, pcs	37	37
Installation of mineralized fire strips, km	19 627.8	5 000
Clearing of mineralized strips, km	71 455.4	75 660
Arrangement of entrances to sources of fire-fighting water supply, pcs	750	0
Operation of fire reservoirs, pcs	429	429
Carrying out preventive controlled fire-fighting burning of brushwood, bedding, etc., ha	697 564.9	25 000
Construction of fire observation posts, pcs	8	4
Construction of concentration points for fire-fighting equipment, pcs	165	160
Monitoring of fire hazard in forests, hectares (total)	73 748 215.4	73 734 138
Extinguishing forest fires, ha	12 109 020	32 074 632

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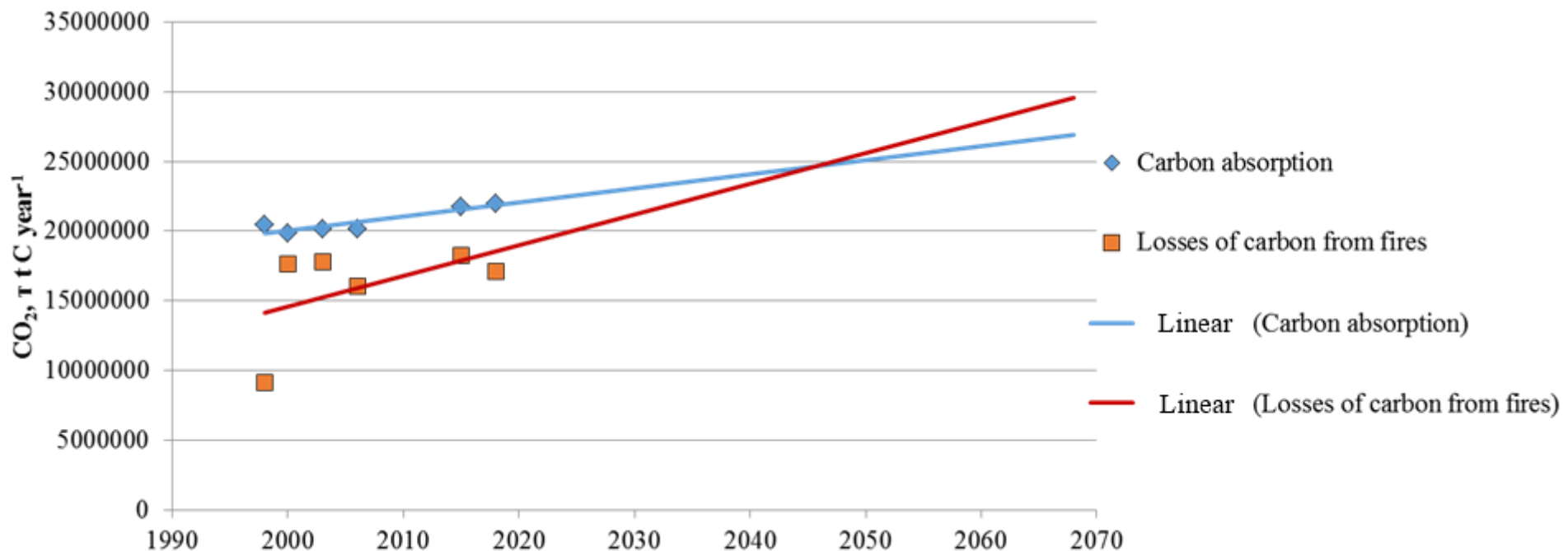
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**Thus, despite the positive carbon budget and the proposed measures, with significant annual losses from forest fires and insignificant reforestation, the situation can become critical and lead to a negative balance, which, in turn, will lead to large emissions of greenhouse gages into the atmosphere already in 2050 year.**



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## Conclusions

**In our opinion, in the conditions of the Far Eastern Federal District and Russia as a whole, it is necessary to realize the importance of catastrophic forest fires for changes in the global climate, as well as to develop criteria for assessing the threshold planetary significance of regional pyrogenic disasters and measures to prevent and eliminate fire situations in any point of the Far Eastern Federal District.**

## References

- 1. Resolution of the Government of the Russian Federation No. 1228 dated 21.09.2019 On Adoption of the Paris Agreement. Electronic access:  
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- 2. Zamolodchikov D.G., Ivanov A.V., Mudrak V.P. Carbon Pools and Flows on Primorsky Krai Forest Fund Lands using ROBUL assessment. Agricultural Bulletin of Primorsky Krai. 2018. 2(10). 46-51.**

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# Thank you for your attention!

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Contact details:

E-mail: [poet.golubev@mail.ru](mailto:poet.golubev@mail.ru)