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CAUSES AND CONSEQUENCES OF FIRES IN NATURAL ECOSYSTEMS, **METHODS OF CONTROL AND PREVENTION.**

EU RECOMMENDATIONS

Analytical note



Fires in Ukraine's natural ecosystems have reached a critical level due to a combination of climate change and the consequences of the war. According to experts, all forests in Ukraine have been affected by military actions to some extent, and climate change has led to unprecedented fires in 2020–2025.

Scale and nature of the problem

Impact of the war on forest resources

- **Direct impact:** 2.5–3.0 million hectares of forests (up to 30% of the total 9.6 million hectares) are located in combat zones or on occupied territories.
- **Indirect impact:** 7 million hectares of forests are being used to supply the population with fuel, and the Armed Forces of Ukraine with timber for fortifications and housing construction.

Fire statistics

Since February 24, 2022, over 2 million hectares of fires have been recorded outside populated areas, resulting in the emission of 48.7 million tons of greenhouse gases into the atmosphere.



Causes of fires

●● Main sources of ignition

1. **Arson** – 90% of fire cases
2. **Burning of stubble by farmers**
3. **Military actions** – mechanical damage, explosions
4. **Climatic factors** – rising temperatures, changes in precipitation patterns

●● Categories of fires by type

- **Ground fires** – burning of the forest floor
- **Crown fires** – spreading to tree canopies (speed up to 20–30 km/h)
- **Peat fires** – particularly dangerous, mainly in northern Ukraine
- **Landscape fires** – spreading from agricultural lands through floodplains into forests

Consequences of fires

●● Environmental consequences

- Loss of forest structure and biodiversity
- Loss of capacity to provide ecosystem services
- Negative impact on the global climate due to greenhouse gas emissions
- Degradation of soil cover



Socio-economic consequences

- Destruction of settlements (in 2020, 22 villages burned down in Luhansk region, with over 1000 people losing their homes)
- Economic losses from the destruction of forest resources
- Air pollution from smoke (including problems for large cities due to the transport of combustion products by strong winds)

Long-term consequences

- Contamination of territories with explosive objects
- Impossibility of restoring forestry on significant areas
- Disruption of the ecological balance of regions

Challenges in firefighting

Technical limitations

- Lack of (essentially non-existent, even in Europe) technical means for extinguishing crown fires
- Shortage of aerial firefighting resources
- Inaccessibility of mined areas
- Insufficient number of roads for fire-fighting equipment access

Organisational issues

- Fragmentation of responsibility among different agencies
- Lack of a unified strategy for managing landscape fires
- Insufficient funding for preventive measures



- Low level of personnel preparedness for new challenges

Fire prevention methods

Strategic approaches

1. Establishment of an early detection system

- Monitoring of weather conditions
- Patrolling on days of high fire risk (15–20 days per year)
- Use of satellite technologies

2. Preventive measures

- Controlled burning of forest litter (only by professionals, with permission from the State Emergency Service of Ukraine and forestry enterprises)
- Creation of firebreaks
- Thinning of forest stands
- Mowing grass along roads

3. Working with the public and land users

- Convincing farmers not to burn stubble
- Training local communities
- Engaging activists and local leadership

Technical solutions

1. Fire barriers

- Creation of 30-meter zones free of combustible vegetation
- Construction of access roads for firefighting equipment
- Installation of water supply systems



2. Fighting peat fires

- Rewetting of peatlands
- Special monitoring of peat areas

Recommendations for firefighting

Short-term measures (1-2 years)

1. Improvement of the regulatory framework

- Adoption of the Strategy for Preventing Fires in Natural Ecosystems
- Development of fire management plans for settlements
- Designation of a responsible authority for coordinating actions

2. Staff training

- Training all 29 000 professional foresters to meet new challenges
- Conducting staff and field exercises
- Studying European experience

3. Technical equipment

- Provision of equipment for controlled burning
- Creation of early detection systems
- Development of a network of firebreak roads

Medium-term measures (3–5 years)

1. Mapping and monitoring

- Conducting LiDAR surveys to assess forest conditions
- Creating accurate maps of contamination by explosive objects
- Developing a forest fire classification system

2. Demining of territories

- Gradual clearance of forests from explosive objects
- Studying international experience (Brandenburg, Croatia, Macedonia)

Long-term measures (5–10 years)

1. Ecosystem restoration

- Development of a new State Forest Management Strategy
- Setting restoration goals (natural forests, managed forests, steppe ecosystems)
- Implementation of an ecosystem-based approach

2. Adaptation to climate change

- Creation of fire-resistant forest ecosystems
- Development of alternative approaches to forest management



Financial needs

●● Priority areas of funding

- Demining of forest areas
- LiDAR surveys and mapping
- Staff training
- Technical equipment for firefighting services
- Creation of fire prevention infrastructure

●● Sources of funding

- State budget of Ukraine
- International technical assistance
- Private sector investments
- Funds from local communities

Висновки

The problem of fires in Ukrainian ecosystems requires a comprehensive approach that combines technical, organizational, and social measures. The key principles should be:



1. **Priority on prevention over suppression** – most resources should be allocated to preventive measures
2. **Interagency coordination** – a single coordinating body is necessary
3. **Engagement of local communities** – success depends on local leadership
4. **Professional training of staff** – adaptation to new challenges posed by climate change
5. **Scientific approach** – use of modern monitoring and forecasting technologies

Without systemic changes in the approach to fire safety management, Ukraine will continue to suffer significant environmental and economic losses, and the risks to the population will increase.

EU recommendations

In 2020–2025, Ukraine faced record forest fires that significantly affected the country's natural ecosystems. The EU provides comprehensive recommendations and support to Ukraine in establishing an effective system for preventing and combating forest fires.



Key EU strategic documents

●● EU FOREST STRATEGY UNTIL 2030

The main document outlining directions for fire prevention policy and enhancing the climate resilience of forests. The strategy lays the foundation for strengthened fire prevention and increased resilience of forest ecosystems.



Forest Strategy for 2030 –
European Commission

●● GUIDELINES FOR GROUND-BASED FOREST FIRE PREVENTION

The document contains detailed recommendations on vegetation management and preventing the accumulation of combustible materials on the ground to facilitate firefighting.

Key EU recommendations for Ukraine

Preventive measures

Forest resource management

- **Active forest management:** Implementation of an active forest management system to reduce fire risk
- **Vegetation management:** Regular clearing of forest litter and control of combustible material accumulation
- **Creation of firebreaks:** Formation of natural barriers to prevent the spread of fire



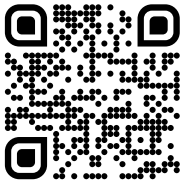
Improving ecosystem resilience

- **Biodiversity:** Increasing species diversity in forests to enhance their resilience to climate change
- **Climate adaptation:** Implementing measures to adapt forest ecosystems to climate change
- **Restoration of disturbed areas:** Forest restoration programmes in areas affected by fires

Monitoring and early detection

European Forest Fire Information System (EFFIS)

EFFIS supports forest fire protection services in EU countries and provides the European Commission with up-to-date information on forest fires in Europe.



EFFIS - European Forest Fire Information System

●● MONITORING SYSTEMS

- **Satellite monitoring:** Use of space technologies for early fire detection
- **Meteorological forecasting:** Predicting fire risk based on weather conditions
- **European fire database:** Maintaining detailed statistics and analyzing trends

Rapid response

EU Civil Protection Mechanism

In 2024, the EU Civil Protection Mechanism was activated 16 times to combat forest fires, including support for Ukraine.



EU Civil Protection Mechanism –
Wildfires

●● INTERNATIONAL COOPERATION

- **Mutual assistance:** Coordination of international assistance in the event of large fires
- **Sharing of resources:** Exchange of firefighting aircraft and specialised equipment
- **Staff training:** Training programmes for Ukrainian specialists in accordance with European standards

Community engagement and education

Community participation

- **Involvement of local communities:** Engaging local residents in forest management
- **Educational programs:** Teaching residents methods to reduce fire risks
- **Early warning system:** Informing the population about the level of fire danger

Research and innovation

FirEURisk project

A unified European response to the growing threat of extreme forest fires, focused on risk analysis and prevention.



FirEURisk Project



●● RESEARCH FUNDING

The EU funds numerous research projects aimed at:

- Development of new fire prevention technologies
- Studying the impact of climate change on fire risks
- Creating innovative fire-fighting methods



EU Forest Fire Research and Innovation

●● FINANCIAL SUPPORT

EU Solidarity Fund

Providing financial assistance to member countries and candidate countries for recovery from natural disasters, including forest fires.

Environmental financing programmes

- **LIFE+:** Funding for environmental projects
- **Horizon Europe:** Support for research and innovation
- **Green Deal:** Investments in climate adaptation

Specific support for Ukraine

After the war

Due to the special circumstances in Ukraine, the EU is developing special support programmes:

- **Restoration of forest ecosystems:** Programs for restoring forests damaged by military actions
- **Technical assistance:** Transfer of European technologies and expertise



- **Institutional support:** Building the capacity of Ukrainian institutions

Forest Europe document

Special report on supporting the restoration and sustainable management of Ukrainian forests.



Supporting Ukrainian Forests Recovery

Conclusions

The EU's recommendations for Ukraine on combating fires in natural ecosystems are based on a comprehensive approach that combines preventive measures, effective response, and long-term restoration. Key elements include active forest management, the use of modern monitoring technologies, international cooperation, and the involvement of local communities.

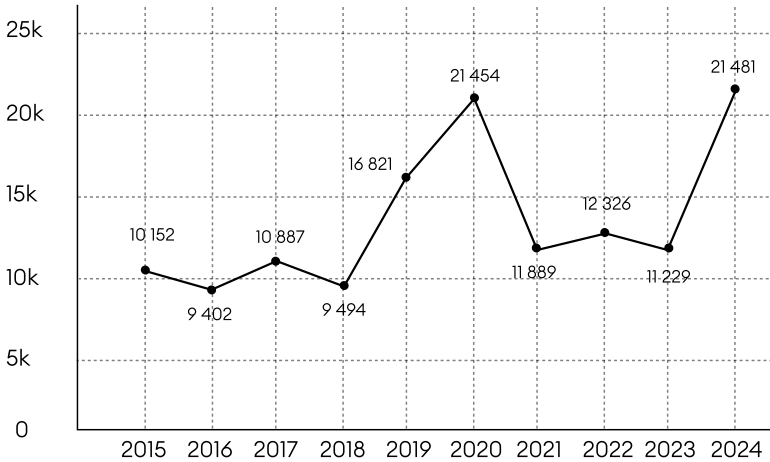
Successful implementation of these recommendations requires a systematic approach, adequate funding, and continuous cooperation with European partners. Special attention is given to adapting European experience to the specific conditions of Ukraine, including the post-war restoration of forest ecosystems.



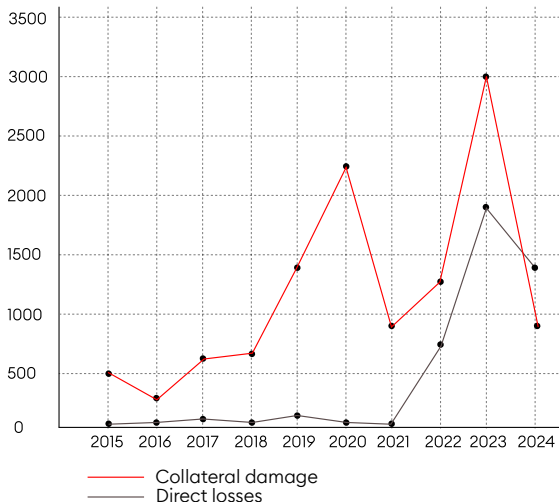
Statistical data presented as graphs, based on information from government agencies (responses to official information requests)

●● STATE EMERGENCY SERVICE OF UKRAINE:

Number of fires in Ukraine's natural ecosystems (2015–2024)

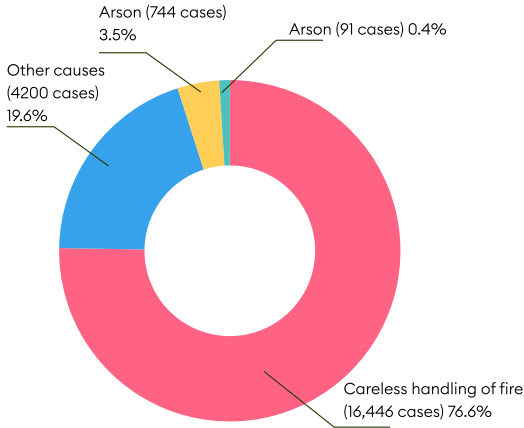


Direct and indirect losses from fires in ecosystems (million UAH)





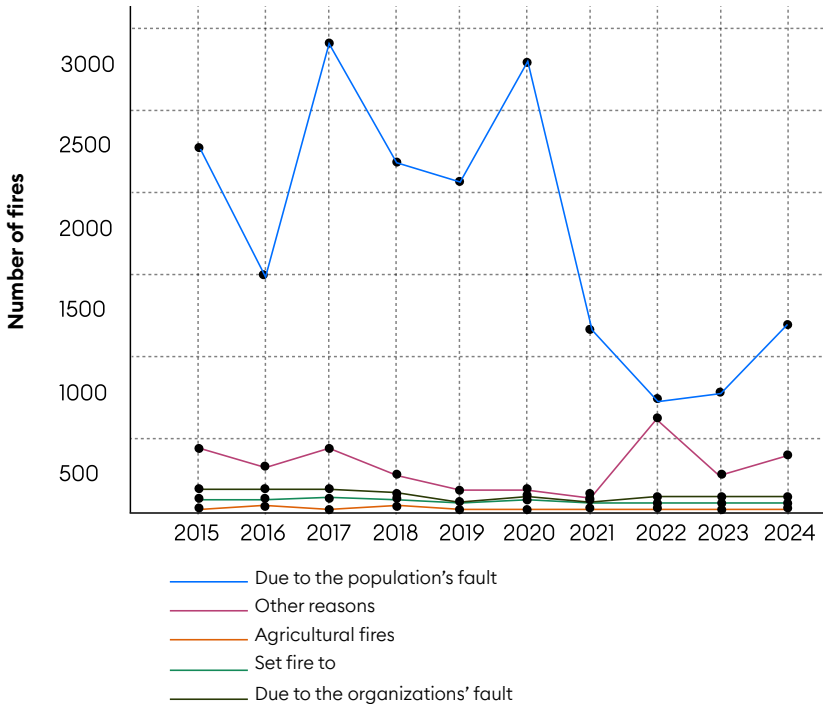
Structure of causes of fires in ecosystems of Ukraine in 2024



**Total in 2024:
21,481 fires**

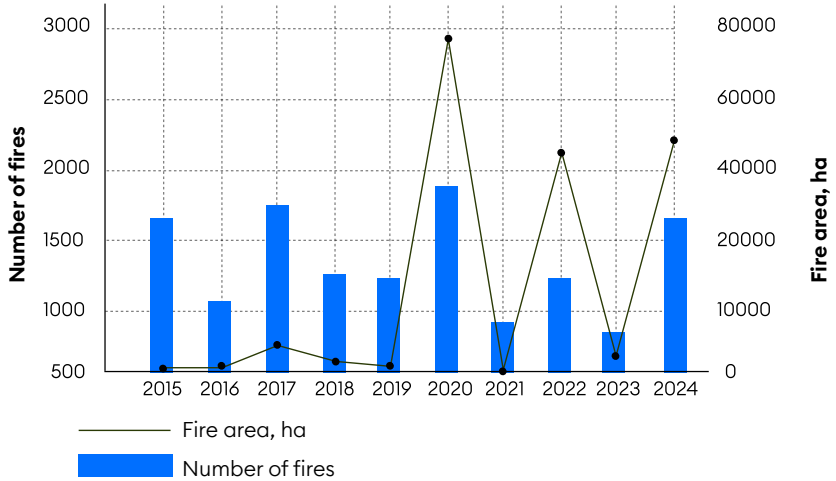
●● STATE FOREST RESOURCES AGENCY:

«Dynamics of the main causes of forest fires in Ukraine (2015–2024)»

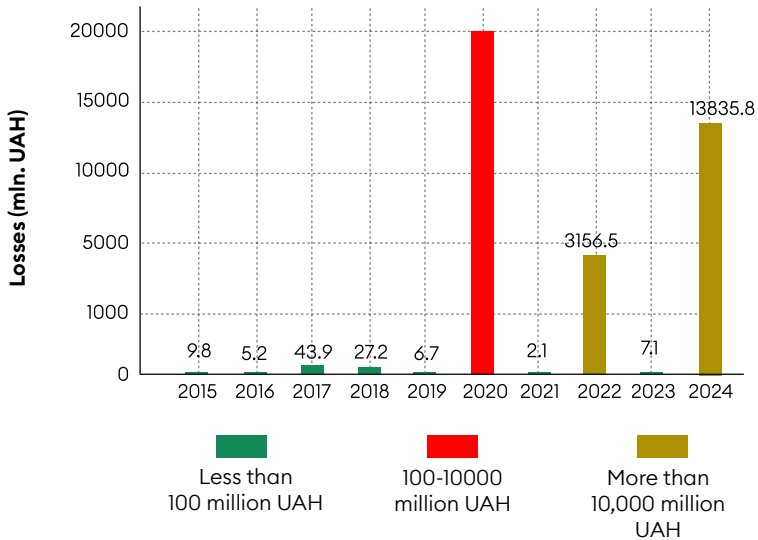




Number and area of forest fires in Ukraine (2015–2024)



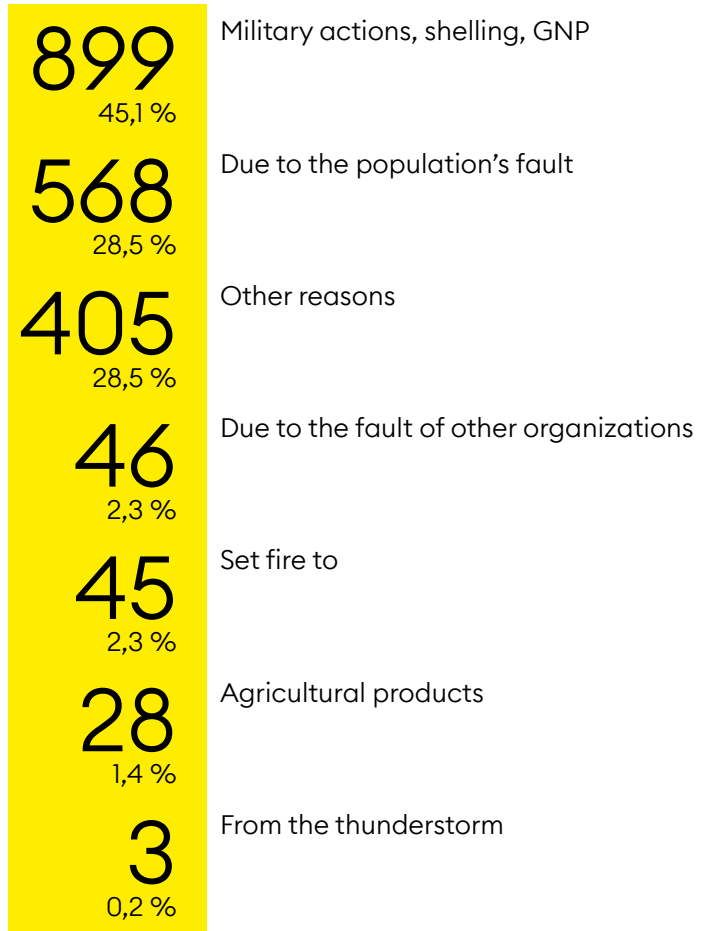
Estimated losses from forest fires in Ukraine (million UAH)






Causes of forest fires in Ukraine in 2024

(Total number: 1994 fires)






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