

Necessity of Coordination and Adjustment of Wildfire Science Terminology: Russian? English Glossary¹

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Abstract

Proper terms contribute to science development, improper terms interfere with development of scientific knowledge. Coordination and harmonisation of terms contributes to coordinated and harmonised development of a respective field of science. Bilingual ideographic glossaries are of great importance for this since they can help to both coordinate our mother-tongue terminology and harmonize it with a foreign one in case of joint coordinated work of both scientific experts and translators who obtained an additional specialization both in Linguistics and in the respective scientific field.

Introduction

Scientific language develops spontaneously as a result of different scientific schools and trends, each suggesting its own terms and notions of existing terms. As a result, detrimental terminological confusion leads to data garbling and misunderstanding among scientists of different scientific schools and countries.

It is next to impossible to resolve wildfire issue without exchange of information among scientists and professionals of different countries. Lack of terminological coordination and harmonization, polysemy of notions and terms, their constant transformation is a grave obstacle (*table 1*).

In the US, Canada and European countries are widely used official glossaries compiled by fire laboratories and departments. For example, *Glossary of Wildland Fire Management Terms used in the United States* (1990) consists of about 1,500 terms in an alphabetical order, *Glossary of Forest Fire Management Terms* (2003) used in Canada comprises about 1,000 terms in an alphabetically-nested order. American and Canadian glossaries serve as a basis for European ones for the former countries were the first to develop and implement systems of fire danger rating and fire behavior and fire effects prediction.

Russia has no special glossaries in this field so far. There are only general reference books: *Terminological Dictionary* (Forestry 2002) and *Encyclopedia on Forestry* (2004). The idea and the first attempt to create a brief terminological glossary on fire science were published in 1972 (Kurbatsky 1972). About 300 terms were thematically arranged by N.P. Kurbatsky.

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Table 1—Polysemy of notions and terms used to define ‘fire danger’ in different countries.

U.S. terms ¹	Canadian terms ²	Russian terms ³
<p>Fire danger – sum of <i>constant</i> danger and <i>variable</i> danger factors affecting the inception, spread, and resistance to control, and subsequent fire damage; often expressed as an index.</p>	<p>Fire danger – a general term used to express an assessment of both fixed and variable factors of the <i>fire environment</i> [i.e. the surrounding conditions, influences and modifying forces of topography, fuel, and fire weather that determine fire behaviour] that determine the ease of ignition, rate of spread, difficulty of control, and fire impact.</p>	<p>Pozharnay opasnost (“fire danger”) – a general term used to express the probability of fire occurrence (“fire risk”) on a specific territory and possible fire damage.</p>
<p>Fire hazard – a fuel complex, defined by volume, type condition, arrangement, and location, that determines the degree of ease of ignition and of resistance to control.</p>	<p>Fire hazard – a general term to describe the potential fire behaviour, without regard to the state of weather-influenced fuel moisture content, and/or resistance to fireguard construction for a given fuel type. This may be expressed in either the absolute (e.g. “cured grass is a fire hazard”) or comparative (e.g. “clear-cut logging slash is a greater fire hazard than a deciduous cover type”) sense. Such an assessment is based on physical fuel characteristics (e.g. fuel arrangement, fuel load, condition of herbaceous vegetation, presence of ladder fuels).</p>	<p>Three types of fire danger in relation to wildfire management tasks:</p> <p>1) natural (typical) fire danger for:</p> <ul style="list-style-type: none"> - areas of 10² – 10⁶ ha, - period of about 10 years, - planning fire prevention; <p>2) daily fire danger according to weather conditions for:</p> <ul style="list-style-type: none"> - areas of 10⁴ – 10⁶ ha, - one day, - wildfire detection; <p>3) “fire maturity” – estimation of whether vegetation plots are ready to burn at a given time for:</p> <ul style="list-style-type: none"> - areas of 1 – 10 ha, - hours, - wildfire behavior prediction.
<p>Fire risk – 1) The chance of fire starting, as affected by the nature and incidence of causative agents; an element of the <i>fire danger</i> in any area. 2) Any causative agent.</p>	<p>Fire risk – the probability or chance of fire starting determined by the presence and activities of causative agents (i.e. potential number of ignition sources).</p>	

¹ Glossary of wildland fire management terms used in the United States 1990

² Glossary of forest fire management terms, Canada 2003

³ Sofronov, Goldammer, Volokitina, Sofronova 2005

Key Features of a New Glossary

At present terminological work lacks systematic management. As a result, one group deals with terminological coordination and adjustment, another group compiles a thesaurus, a different group works at a bilingual terminological dictionary, and one more isolated group issues a State Standard. Since there is hardly a contact among these groups of experts bilingual dictionaries fail to somehow coordinate and harmonize translation equivalents, often numerous, suggested for a term (Grinyov 1993). The only way to provide faithful translation is to create special bilingual glossaries with present and earlier definitions as well as interpretation by different scientific schools and scientists. Each dubious term or a pair of terms in both languages should be accompanied by a comment provided by a linguist-translator, who is at the same time a specialist in the given field and works in cooperation with highly qualified experts.

Branch terminological State Standards can be of help in Russian glossary creation; however, their quality is not always high for they are frequently made up privately by not well-known and sometimes insufficiently competent authors. In branch encyclopedias, a corresponding article for a term is usually ordered only to one expert who gives only one version of it revealing his/ her personal point of view.

In view of integration of the Russian fire science into the world science our aim is to create a universal bilingual ideographic (i.e.thematic) glossary with the following features:

- ✓ Language – *bilingual* (Russian? English)
- ✓ Subject – *special* (wildfire science terminology)
- ✓ Time – *modern*
- ✓ Scope – *thesaurus - reference - interlingual*
- ✓ Address – *for specialists*
- ✓ Function – *inventory and standardizing*
- ✓ Volume – *small* (up to 500 basic terms without nomenclature)
- ✓ Order – *ideographic with alphabetical and nested indices in appendices*

According to one of the founding fathers of lexicography Kh. Kasares (1958), “alphabetical order is organized chaos” (Grinyov 1993). Therefore, we give preference to thematic principle, which reveals the notional structure of a field and, correspondingly, systematic links among terms in the coordinated terminological systems. Terms are arranged by sections in the glossary and logically (“from the general to the special”) in each section. Terms and their brief definitions are given in parallel in Russian and in English with corresponding translation of definitions into English or Russian. *Table 2 and figure 1* give an example of an article from such a glossary dealing with the thematic group “Post-fire areas”.

Parallel study of Russian and English terms and their notions is efficient if the following categories are determined and correspondingly marked: 1) synonymous terms in both languages; 2) half-synonymous terms with partial or approximate coincidence of meanings; 3) polysemantic homonymous terms (or half-homonymous terms); 4) disputable terms and notions; 5) notions having no counterparts in Russian or in English.

Table 2— Example of a glossary article oriented towards English speaking recipients.

RUSSIAN TERMS	ENGLISH TERMS
<p>POZHARISHCHE (“site of a fire”) – a vegetation site over which a fire has recently spread so that combustion traces are evident on the soil (e.g. ashes, carbons, firebrands). This term is attributed to the site till the combustion traces are covered by alive vegetation floor or tree litter (in grassless stands). It can take a couple of weeks or a couple of years and over depending on conditions for vegetation floor regeneration. <i>Fresh gar’</i> is an unwanted term ¹.</p> <p>FRESH GORELNIK – pozharishche in a tree stand with killed, dying or heavily damaged trees. A tree stand is called this way till killed and died trees turn into dead-standing trees.</p> <p>GORELNIK (i.e. “fire-damaged forest”) – a post-fire forest site with died (dead-standing) trees (tree mortality is over 25 percent) and relative basal area over 0.2 falling on live trees. The forest site is called this way from termination of killed and died trees transformation into dead-standing trees (or from termination of the period when the site is called pozharishche applicable to young and low marketable tree stands) and till the <i>second tree storey</i> is formed. <i>Old gorelnik</i> is gorelnik of more than 20 years old ¹.</p> <p>GAR’ (“burnt area”) – post-fire forest site with died (dead-standing) trees (tree mortality over 80 percent) and relative basal area of 0.2 and less (or 0.3 and less in young tree stands) falling on live trees. The forest site is called this way from termination of killed and died trees transformation into dead-standing trees (or from termination of the period when the site is called pozharishche applicable to young and low marketable tree stands) and till a <i>young tree stand</i> is formed. <i>Old gar’</i> is gar’ of more than 20 years old ¹.</p>	<p>BURN (US)</p> <p>1) an area burned over by wildland fire; 2) a reference to a working fire ².</p> <p>BURN or BURNED AREA (Canada)</p> <p>any unit of land over which a fire of any kind has spread ³.</p>
<p>Comments.</p> <p>? Available definitions of POZHARISHCHE in Russia: a site where a wildfire took place ^{4,5}. This interpretation is too broad and indefinite since it involves all vegetation plots <i>ever</i> passed by a fire, and traces of wildfires, take for example ancient ones, can be found almost everywhere.</p> <p>? Available definitions of GORELNIK in Russia: 1) synonym to GAR’ ⁶; 2) sites with partially died tree stands after a wildfire ^{4,7,8}. Gorelnik always has trees, fire-damaged forest, and GAR may be devoid of trees as a result of repeated fires.</p> <p>? Available definitions of GAR’ in Russia: 1) <i>any</i> forest site over which a fire has spread ^{6,9}; 2) <i>pozharishche (forest area)</i> with <i>totally</i> died off trees ^{4,5,7,8}. One should take into consideration a forest inventory definition of “gar”, since the forest inventory gives information about burnt areas: during forest inventory “gar” is referred to “<i>area not covered by forest vegetation</i>” ⁸. This means that “gar” may have even live trees on condition that their relative basal area does not exceed 0.2 (or 0.3 in young stands).</p> <p>? In the US and Canada a generalized term is used for all post-fire areas: BURN or BURNED AREA. Therefore, in English-Russian translation one should resort to specification, and in Russian-English translation – to descriptive rendering of the term.</p>	

¹ Sofronov and Volokitina 2007 (in print)

² Glossary of wildland fire management terms used in the United States 1990

³ Glossary of forest fire management terms, Canada 2003

⁴ Ozhegov 1999

⁵ Kurbatsky 1972

⁶ Melekhov 1946

⁷ State Standard 1983

⁸ Encyclopedia of forestry 2006

⁹ Forest Encyclopedia 1985

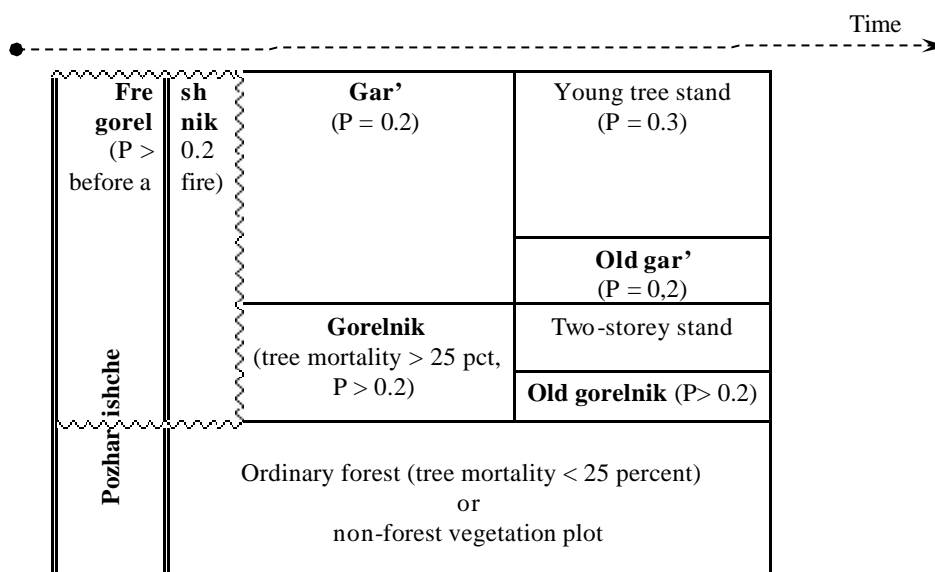


Figure 1— Classification of post-fire areas in relation to time of their existence (P – relative basal area of a tree stand).

Main Principle of the Glossary Creation

Field theory and field modeling in linguistics can be of much benefit for creation of this glossary. Study of terminological fields and selection of notions that are part of them are integral for creation of special dictionaries.

A.A. Reformatsky was the first to formulate a theory of terminological fields: “A field for a term is a respective terminology, out of which a word is no longer a term” (after Borkhvald 2000). For instance, outside fire science terminology the word “front” loses its meaning of “the part of a fire within which continuous flaming combustion is taking place”. In military science, from which this term originated, “front” means: 1) a line of battle; 2) a zone of conflict between armies. In meteorology, front is the boundary between two air masses of different density.

Logical-conceptual analysis of special texts (Melekhov 1978; Sofronov and others 2005; Volokitina and Sofronov 2002, Volokitina and others 2005) allowed us to create a paradigmatic structure of the Fire Science (table 3). Its logical-conceptual system considerably differs from the structure suggested by N.P. Kurbatsky in 1972 (table 4) since fire science does not cease to develop. At present one can distinguish 5 terminological macrofields and 15 terminological microfields, which may fall into smaller groups. Moreover, partial mutual overlapping of microfields (e.g. “Wildland fire danger” and “Wildfire behavior prediction”) as well as partial overlapping of some microfields by macrofields (e.g. “Means and methods of fire suppression” and “Use of the positive fire role”) is observed. Thematically classifying modern American and Canadian terms we came to the conclusion that the paradigmatic structure of the Fire Science in Russia corresponds to that in the US and Canada.

Table 3— Suggested logical-conceptual system of the Fire Science.

Macrofields	Microfields
1. General terms	
2. Nature of wildfires	2.1. Problem of wildfires, fire statistics 2.2. <i>Vegetation fuels (VF)</i> 2.2.1. <i>VF properties</i> 2.2.2. <i>VF classification</i> 2.2.3. <i>VF combustion</i> 2.3. Structure of a wildfire 2.4. Characteristic and classification of wildfires 2.5. Wildland fire danger (fire danger, fire hazard, fire risk and their estimation)
3. <i>Wildfire management</i>	3.1. Wildfire protection arrangement 3.2. Wildfire detection 3.3. Means and methods of fire suppression 3.4. <i>Information database</i> 3.5. <i>Wildfire behavior prediction</i> 3.6. Fire prevention measures
4. Wildfire effects	4.1. Characteristic and classification of areas over which a wildfire has spread 4.2. Prediction of wildfire effects
5. <i>Use of the positive fire role</i>	5.1. <i>Prescribed burning in clear cut areas</i> 5.2. <i>Prescribed burning in forests</i>

Table 4— Logical-conceptual system of the Fire Science according to N.P. Kurbatsky (1972).

Macrofields	Microfields
1. General terms	
2. Nature of wildfires	2.1. Objects of combustion and their properties 2.2. Structure of a fire (morphology) 2.3. Fire spread (geometrical kinetics and fire development) 2.4. Fire danger
3. Ground forest protection	3.1. Organization 3.2. Preventive measures 3.3. Fire detection 3.4. Fire suppression
4. Air protection	4.1. Organization 4.2. Fire detection 4.3. Fire suppression
5. Forest fire strategy and tactics	
6. Vegetation fire effects and their account	

Conclusions

As a result of our analysis we came to the conclusion that first of all a systematized list of notions on fire science existing in different countries should be made. Then appropriate terms should be selected, and not the other way round as it is done nowadays. This will allow proper adjustment of fire science terminology and will specify correspondence of terms and notions in different countries.

Creation of a bilingual ideographic glossary with features mentioned above is of great importance for it will provide specialists and translators with a deeper insight of

the fire terminology in three countries and will make it possible to involve in the process of standardization both Russian and foreign specialists.

Further research of terminological terms of the Fire Science in Russia, US and Canada will contribute to deeper study of the terminology earlier not involved in the linguistic analysis and will help to coordinate and harmonize the terminological apparatus of the Fire Science.

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References

- Borkhvald, Olga V. 2000. **Vocabulary of the Russian gold mining in historical interpretation**. Krasnoyarsk: KGPU; 401 p.
- Encyclopedic dictionary of forestry**. Volume 1. 2006. Moscow: VNIILM; 424 p.
- Forest encyclopedia**. 1985. Moscow: Sovetskaya entsiklopedia; 564 p.
- Glossary of forest fire management terms**. 2003. Manitoba: Canadian Interagency Forest Fire Centre; 62 p.
- Glossary of wildland fire management terms used in the United States**. 1990. Society of American Foresters; 138 p.
- Grinev, S.V. 1993. **Introduction to terminology science**. Moscow; 309 p.
- Kurbatsky, Nikolai P. 1972. **Terminology of forest fire science**. In: Forest fire science issues. Krasnoyarsk: ILiD SO RAN ASSR; 171-231.
- Melekhov, Ivan S. 1978. **Forest fire science**. Moscow: MLTI; 71 p.
- Melekhov, Ivan S. **Fire impact on forest**. 1948. Moscow, Leningrad: Goslestekhizdat; 126 p.
- Ozhegov, S.I.; Shvedova, N.Yu. 1999. **Thesaurus of the Russian language**. Moscow: Azbukovnik; 944 p.
- Sofronov, Mark A.; Goldammer, J. A.; Volokitina, A. V.; Sofronova, T.M. 2005. **Wildland fire danger**. Krasnoyarsk: IL SO RAN, Max Planck Institute for Chemistry, SibGTU; 330 p.
- Sofronov, Mark A.; Volokitina, A.V. [In press]. **Methodical aspects to characterize areas burned over by a wildfire**. Lesovedenie.
- State Standard 17.6.1.01–83. Nature protection. Forest protection and conservation. Terms and definitions**. 1983. Moscow: Gos. Komitet SSSR po standartam; 8 p.
- Terminological dictionary of forestry** 2002. Moscow: VNIILM; 480 p.
- Volokitina, Alexandra V.; Sofronov, M.A. 2002. **Vegetation fuel classification and mapping**. Krasnoyarsk: Sukachev Institute of Forest; 314 p.
- Volokitina, Alexandra V.; Sofronov, M.A.; Sofronova, T.M. 2005. **Surface fire behavior prediction using vegetation fuel maps**. Krasnoyarsk: SibGTU; 94 p.