

EVALUATION OF CLIMATIC RISKS MANIFESTED ON REPUBLIC OF MOLDOVA TERRITORY

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Key words: risk, vulnerability, hydrometeorological hazard, droughts, extreme temperatures, strong winds.

Résumé. *Au présent, conforme le Centre de Investigations de Hasardes Naturelle (Université de la Luviana, Belgique), les risques hydrométéorologiques dans le monde entier, ont devenue très intensive. Les résultats obtenus, confirme que au-dessus de l'est de l'Europe en général et dans la République de la Moldavie en particulier, l'alternations entre période chaude et froide, humé et aride ont provoqué de risques climatiques que cause substantiel perdue, en spécial pour l'agriculture. Nous avons calculé les valeurs spécifiques pour la manifestation de température minimale en hiver 2006, qui ont permis d'avoir une image de l'intensité et de la répartition spatiale des aires de stress climatique influencé de type de circulation générale qui vient de nord-est de l'Europe.*

1. Introduction.

According to United Nation/International Strategy for Disaster reduction (ISDR, Geneva, 2004) **risk** represents the probability of negative consequences and of anticipated losses which result from natural and anthropogenic hazardous phenomena and vulnerability conditions interaction. **Vulnerability**, in its turn, means conditions determined by natural, social, economical and ecological factors or processes that intensify a community's susceptibility to hazard's influence.

2. Input data and methods.

Present manifestation tendencies of natural risk factors, and their manifestation frequency lead to the conclusion that hydro meteorological hazards manifestation risk will increase [1]. The number of the risk phenomena caused by weather conditions has increased by 5.5 times, and at the same time the number of natural hazards caused by other factors has increased only by 2.4 times beginning since the middle of the past century (figure 1).

Number of cases



Figure 1. Catastrophic hazards dynamics caused by weather conditions or other natural factors

Annex: hydrometeorological hazards include droughts, extreme temperatures, strong winds
 Source: <http://www.balwois.net>

According to statistical data from Natural Hazards Epidemiologic Investigations Center (Belgia, Luviana University), the most frequent natural hazards of hydrometeorological origin (figure 2) on the territory of the republic are: floods, droughts, strong winds. In the period 1992-2003, 90% of total dangerous natural phenomena are extreme hydrometeorological phenomena. The most frequent are floods (50%) (causing 92% of the human victims), strong winds (25,5%), followed by droughts (12,5%).

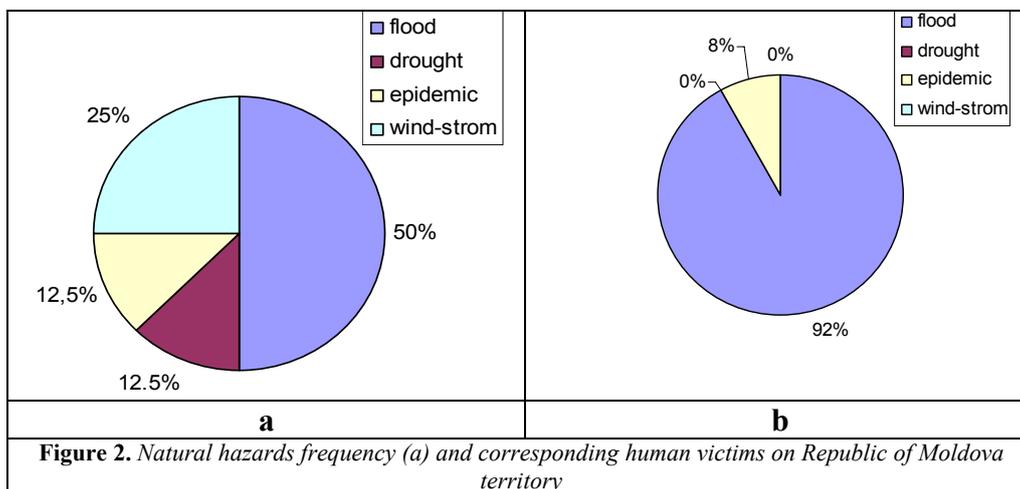
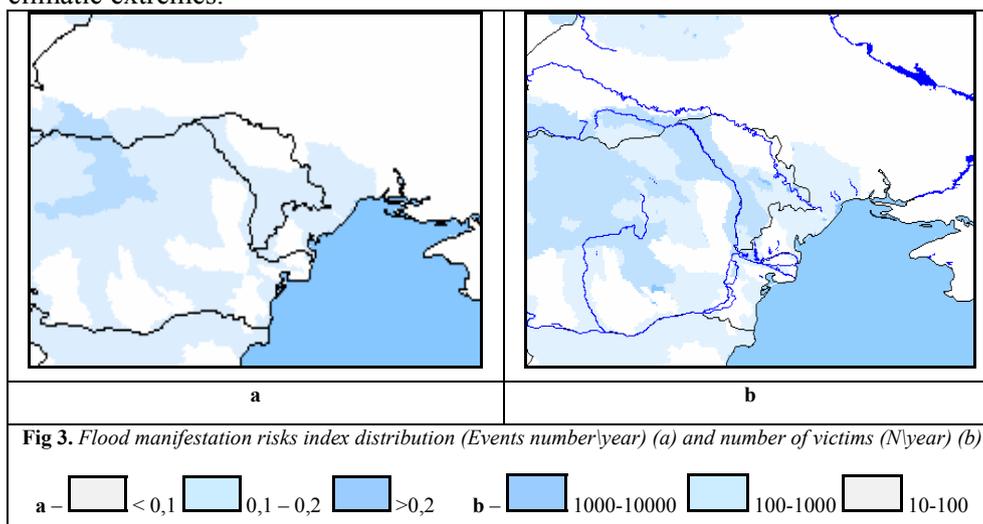


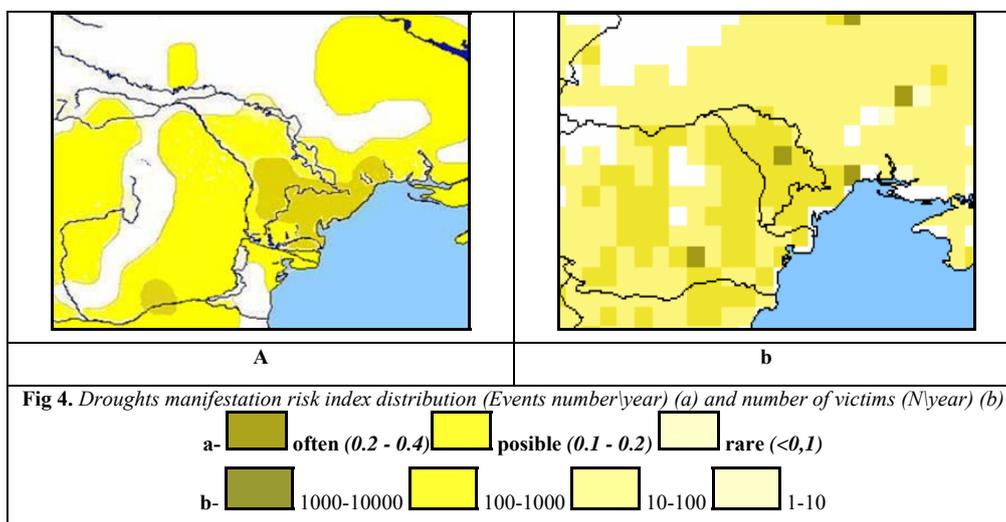
Figure 2. Natural hazards frequency (a) and corresponding human victims on Republic of Moldova territory

Climatic extremes manifestation level and consequent economic loss evaluation are based on the risk probable index which represents nothing else but

the correlation between frequency change and manifestation probability of the climatic extremes.



Comparative evaluation with other neighborhood territories using this Center data leads to the conclusion that catastrophic floods manifestation risk is about 1-2 times per 10 years, which is less than in several Romania regions, where such frequency is 2-3 times per 10 years (figure 3).

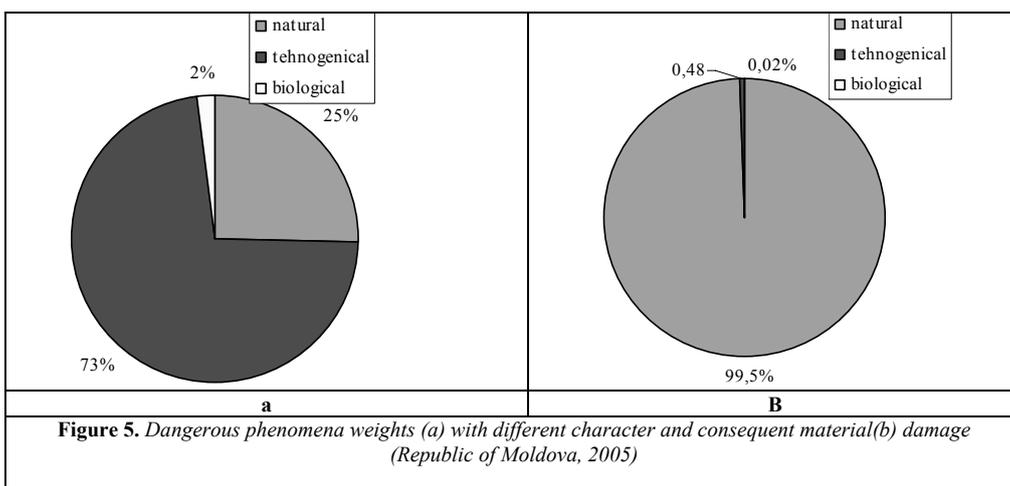


But at the same time, according to further evaluations, we state that the territory of the republic is very vulnerable to time manifestations and droughts. Data analysis shows us [1], that Moldova is influenced by intense droughts with a frequency of manifestation from 2 till 4 droughts in a decade. According to the evaluation of the UN Development Programme in environment, 280 thousand people suffer from catastrophic droughts in Republic of Moldova. For comparison we can state that the number of the victims of floods and earthquakes is 193 thousand and 19 thousand inhabitants respectively.. Vulnerability's relative index is zero, which means that according to this organization data, victims from droughts and famine were not registered.

3. Results

In 2005, according to the data of Emergency Situations Department of Republic of Moldova, from total dangerous natural and technogenic phenomena (150 cases), 38 cases had a natural character, among them spring frosts, hail of big dimension, rain showers often accompanied by big storms are mentioned.

According to figure 5, if natural (climatic) risks manifestation percentage is 25% of total risks manifested on the territory of the republic in 2005, then material losses caused by them represent 95% of the total material damages which is equal to 95 million 605 thousand lei. What is more, approximately 30% of this amount of money was lost at the end of spring in a quite short interval (23-27 May) because of torrential rains accompanied by hails with a big dimension, causing material damages of approximately 3-4 million lei in some regions (figure 6).



Thus we can state that most affected regions after abundant rains manifestation accompanied by hails in the above mentioned period are Stefan-Voda, Ocnita, Cahul and Cantemir.

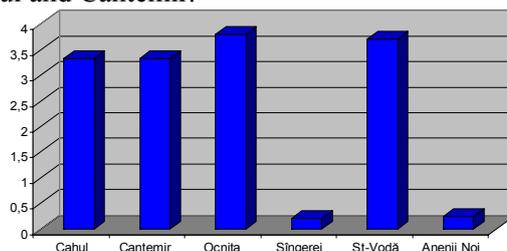


Figure 6. Material damage (million lei) after abundant rains accompanied by hails with a big dimension in the period of 23-27 May, 2005 **mln.lei**

The winter of 2006, by its extreme values, became the most cold winter registered in last 40 years on the territory of the republic. The main cause was deep advancement on the continent (from North-East direction towards South-Eastern Europe) of anticyclonic masses generated over Taimyr peninsula (figure 7), causing more pronounced risk temperatures on Southern and South-Eastern parts of the republic (Stefan-Voda, Leova, Comrat). Here, frosts intensity was more pronounced than in Balti Steppe.

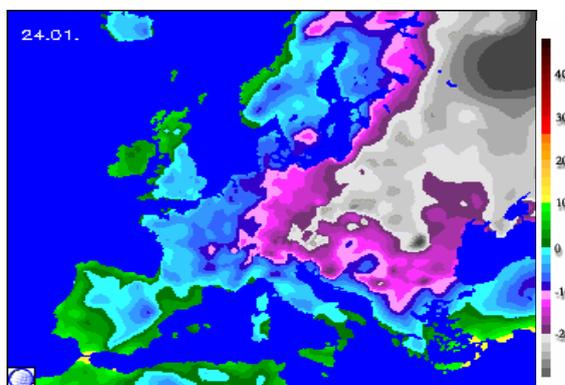


Figure 7. Extreme minimum temperature manifestation in Eastern Europe (24.01.06)

Comparative analysis of extreme minimum temperatures (figure 8), manifested in 2006 with extreme values registered in the most cold winter in the second half of the previous century (1963) shows us, that the anomalies of winter 2006 were most pronounced in the above-mentioned regions. These climatic risk

conditions caused substantial damage to vineyard, fruit trees, and influenced to a great extent the low harvest.

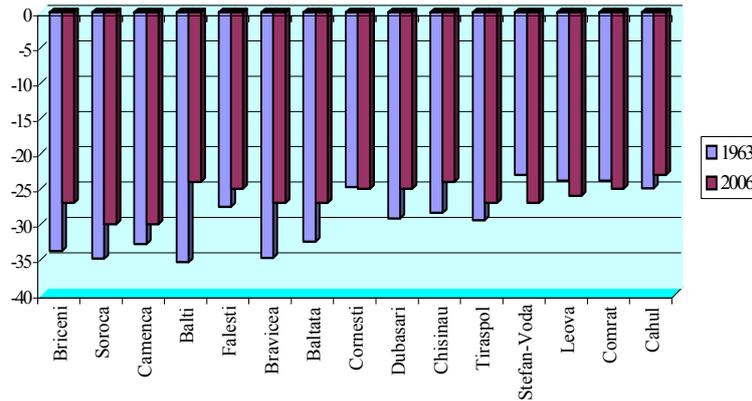


Figure 8. Thermal anomalies (in 1963 and 2006) on the territory of the Republic of Moldova
 Cartographical modelling of extreme temperatures regime (figure 9) manifested in the period 23-26 January allows stating that orographic particularities have intensified this regime in parallel with air masses genesis (anticyclonic).

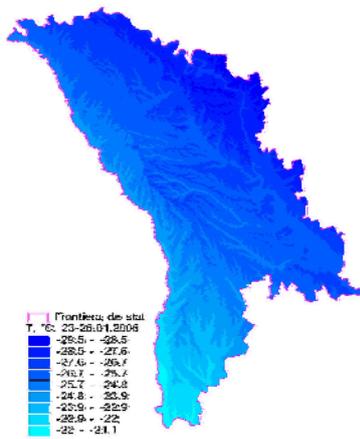


Figure 9. Risk temperatures distribution in 23.01-26.01, 2006 period on Republic of Moldova territory

In this context, we can state that the evaluation of the climatic risks in the present period, when an increase [2,3] in their intensity and frequency is observed,

is extremely useful for the sustainable development of Republic of Moldova economy.

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