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SETTING THE SCIENTIFIC TASK OF SUBSTANTIATING THE LIST AND VOLUME OF MEASURES TO PROTECT THE POPULATION BY EVACUATION

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Abstract:

As part of the formulated scientific problem are defined: the initial data for the substantiation of the list and volume of measures for the evacuation of the population, presented the target function in the form of a performance indicator dependence on the main factors affecting the local government readiness to receive the evacuated population, defined controlled variables, the main restrictions and assumptions adopted to solve the problem.

Keywords: Evacuated population, ensuring the livelihood of the evacuated population, types of life support, life support activities, local authorities (city, district) to receive the evacuated population.

INTRODUCTION

At the present time, the most reliable way to protect the population from the dangers arising in emergency situations associated with catastrophic flooding during the destruction of hydraulic structures as physical protection is the evacuation of the population.

The main document regulating the conduct of evacuations is the evacuation plan, which is entrusted to the authority of state authorities in the field of civil protection. How so the public authorities on the ground, carry out measures to prepare and organize the evacuation and dispersal, accommodation of the population in safe zones, deployment of medical and other organizations. Which as indicated, the responsibilities of the operating organization to ensure the safety of hydraulic structures should finance measures to operate a hydraulic structure, to ensure its safety as well as work to prevent and eliminate the consequences of accidents of a hydraulic structure [1,2].

The analysis has shown that during the population evacuation in the period of increasing threat of aggression in the planned areas of accommodation (local authorities) the provision level of material resources for a number of indicators will not meet the required values. Of course, in this way can lead to negative social consequences such as disease, loss of life, etc. To prevent such a problematic situation is possible through the justification of a rational list and volume of measures to ensure the vital functions of the evacuated population, taking into consideration the limitations of allocated resources [5,6].

METHODS AND MATERIALS

In solving this problem it is necessary to take into account a number of aspects, which were analyzed in the articles [3]. During the analysis, these aspects were systematized into three groups:

the first group includes aspects characterizing the possible risks of adversary impact, quantitative and qualitative characteristics of the population to be evacuated as well as the projected duration of their stay in the areas of accommodation;

The second group of aspects contains information characterizing the ability of local educational authorities to accept the evacuated population in terms of financial, material and human resources;

The third group takes into account the possible threat of secondary factors from natural and man-made emergencies in the location area, which may affect the volume of measures taken to ensure the life and activity of the evacuated population.

In order to choose a rational set of measures to ensure the life of the evacuated population during the period of preparation of local authorities for the reception of the evacuated population, it is necessary to solve the following specific problems:

Evaluate the current level of readiness of local authorities to suspend evacuated populations;

substantiate a rational set of measures for life support of the evacuated population, taking into account the current level of readiness of the municipality to receive them.

To assess the current level of readiness of local authorities to receive evacuees, it is necessary to solve the following several tasks:

To classify measures to ensure the life of the evacuated population, on the basis of which to determine the list of types of support;

Determine the significance types of life support for the evacuated population;

assess the readiness to receive the evacuated population by each type of provision and obtain an integral assessment of the current readiness level of the local government, taking into account the importance of all provision types.

The initial data for solving the first problem are:

a list of measures to ensure the livelihood of the evacuated population, which should be carried out in the process of preparing local authorities for the reception of the evacuated population.This set of measures can be determined on the basis of the analysis of plans for earlier exercises and drills as well as normative legal acts regulating the activities of the territorial subsystem of the state civil protection system [1,2];

expert knowledge on the feasibility of combining specific activities within a single class of life support for the evacuated population. Types of life support for the evacuated population should be understood as vital material resources and services, grouped by functional purpose and similar properties, used to meet the minimum necessary needs of the evacuated population in water, food, shelter, basic necessities, medical and sanitary-epidemiological, informationaltransport and communal and domestic support.[3,4].

To solve the next second problem you need the following input data:

The total number of life support types, which implementation will ensure a given readiness level of local authorities to receive the evacuated population;

Scenario of adversary impact on potentially hazardous objects located within the boundaries of the area, forecasting estimates of possible types of emergencies and the scale of their consequences;

Experts' knowledge of the potential contribution of each type of life support to the readiness level of government to receive the evacuated population, taking into account the scale of possible emergencies.

The input data for the third problem are:

list of life support;

quantitative assessments of the each support type significance;

the actual volume of activities carried out in local bodies within the framework of each type of life support in advance (in peacetime);

The projected number of people to be evacuated and the estimated time of their presence in the areas where they will be housed:

experts' knowledge of the comparative real preparedness of local authorities by life support type.

The initial data for the substantiation of a rational set of measures to ensure the life of the evacuated population, taking into account the current level of readiness of the municipality to receive the evacuated population are:

list of life support types for the evacuated population;

a list of activities to ensure the population life, which are included in each type of life support for the evacuated population;

the amount of funds allocated from the budget to prepare local authorities to receive evacuees;

the required volume of financial resources needed to fully implement all life-support activities carried out during the preparation of local authorities for the reception of the evacuated population (during the escalation period of the aggression threat).

RESULTS AND DISCUSSION

Thus, the statement explanation of the scientific problem of the study can be formed as follows.

For given:

At=(1,2,...,t,...,T)- a list of activities for life support, carried out in the period of preparation of the municipality to receive the evacuated population, t = 1.T;

T - the total number of life support measures to be implemented in the process of preparing governments to receive the evacuated population;

$W_{сц}$ - scenario of adversary impact on a potentially dangerous object located in the local authorities territory and forecast estimates of possible types of emergencies and their consequences scale;

$E_k^{поо}$ - list of types of potentially hazardous objects located within the boundaries of the district;

K - the total number of types of potentially dangerous object located within the boundaries of the district;

R_k- amount of potentially dangerous object of the k-th type;

X_k-production characteristics of potentially hazardous object of the k-th type;

M_k- location of potentially hazardous object of the k-th type;

$P_{пр}$ - a list of sources of natural emergencies and their main characteristics;

N_{np}- the projected number of evacuees;

t_{np} - the estimated time of stay in the areas of evacuated populations;

$G_{\text{пер}}$ - the list and volume of material and technical resources (supplies) prepared in advance for the life and activity of the evacuated population;

D - a list of documents and regulatory legal acts regulating the nomenclature and scope of activities for the life activities of the evacuated population;

S - the amount of funds allocated to prepare local authorities to receive evacuees during a period of increasing threat of aggression. It is necessary to determine the list and volume of life support measures (X_{ri}^{*}), which implementation will ensure the maximum increase in the readiness of local authorities to receive the evacuated population, so will be the following:

$Q_{(\mathrm{X}_{ri}^{*})}$=f$(a_{ri}^{\text{вк}}(a_{ri}^{\text{пр}}, \mathrm{C}_{r}^{\text{пот}}))$, $(X_{ri}\ (A_t, A_i)) \underset{\mathrm{X}_{ri}}{\Rightarrow} max$

with the following restrictions

$$\sum_{i=1}^{n}\sum_{r=1}^{R} S_{ri}X_{ri} \leq S$$

whereX_{ri}- the volume of the r-th measure that is part of the i-th type of life support and is carried out in preparation for the reception of the evacuated population;

X_{ri}^{*} - rational volume of measures, the implementation of which will ensure the maximum increase in the readiness of local authoritiesto receive the evacuated population;

A_i= (1,2,...,i,. . . ,n) - list of life support types;i=l,n where n is the number of life activities of the evacuated population,$A_i = f(A_t)$;

$\alpha_{ri}^{\text{вк}}$- is the value of the contribution of the r-th measure of the i-th type of life support to the level of readiness of local authorities to receive the evacuated population;

$\alpha_{ri}^{\text{пр}}$= $f(a_{ri}, S_{ri})$ - a given estimate of the significance of the r-th measure of the i-th type of life support, taking into account the required financial resources for its implementation in full;

$a_{ri} = f(a_r^i, w_i)$ - an estimate of the significance of the r-th measure, taking into account the significance of the i-th type of life support;

a_r^i - an estimate of the significance of the r-thactivity included in the i-th type of life support;

$\omega_i = f\ (A_i, \mathrm{E}_k^{\text{поо}}, P_{np}, R_k, X_k, M_k)$ - an estimate of the significance of the i-thtype of life activity of the evacuated population;

$S_{ri}=f(v_{ri}^{\text{тр}}, G_{\text{пер}}, F_{\text{пер}})$ - the required amount of funds for the full implementation of the r-thactivity, which is part of the i-thtype of life activity of the evacuated population;

$u_{ri}^{\text{тр}}$ - $f(N_{\text{пр}}, t_{\text{пр}})$ - is the volume of the r-thmeasure that must be performed for the life of the evacuated population;

$\mathrm{C}_r^{\text{пот}} = f(\mathrm{C}_r^{\text{тек}})$ - value of the potential increase in the preparedness level of local authorities to receive evacuated population;

$\mathrm{C}_r^{\text{тек}} = f(C_i, w_i)$ -the importance of the current level of readiness of local authorities to receive evacuees;

$\mathrm{C}_i = f(v_{ri}^{\text{вып}})$ - is the readiness level value of the r-th type of life activity of the evacuated population;

$u_{ri}^{\text{вып}}$ -is the share of the volume of the r-thevent, performed by the time of the assessment of the readiness of local authorities for the i-th type of life activity of the evacuated population.

The general scheme of the study to solve the formulated scientific problem is presented in figure 1.

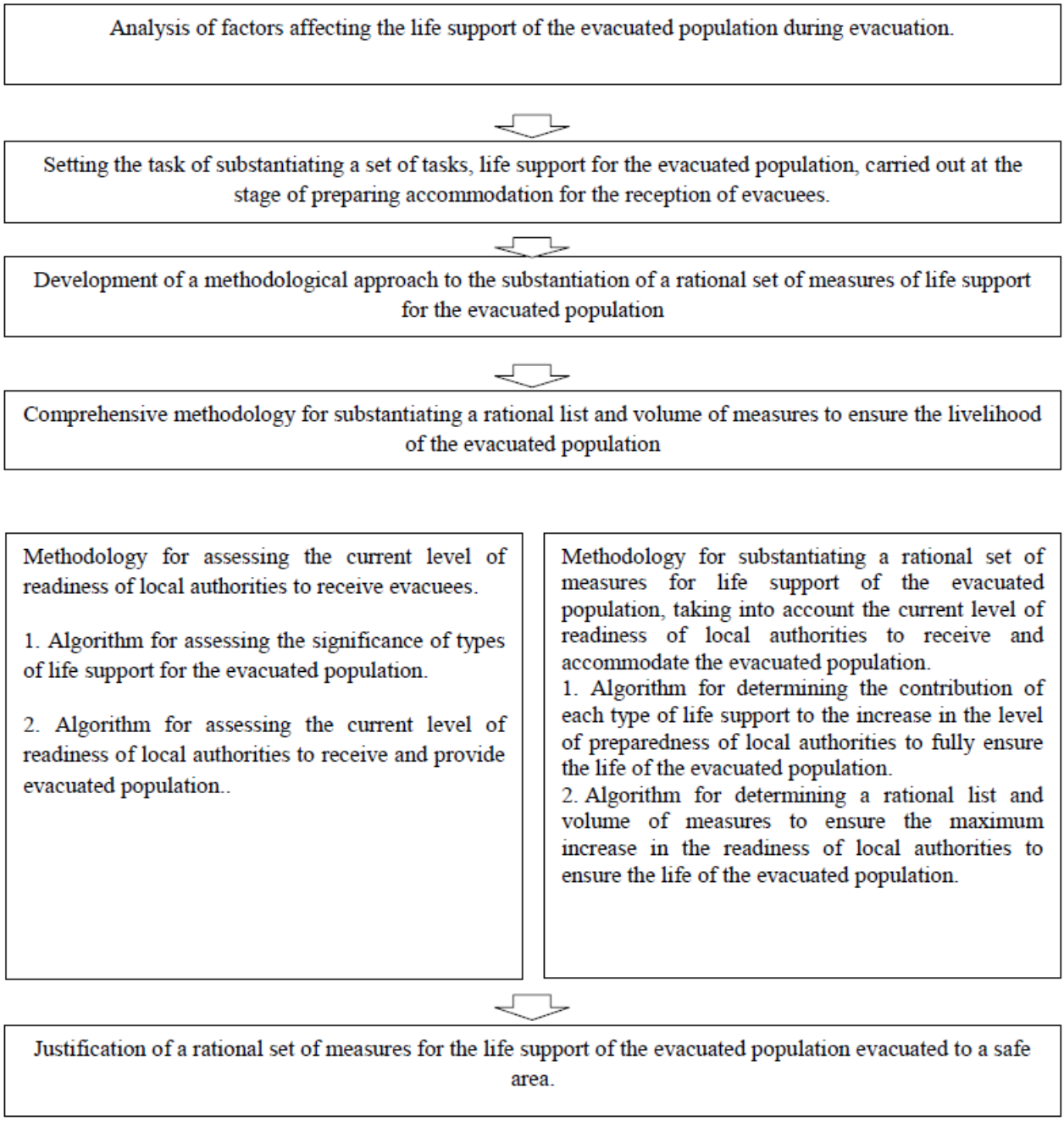

Figure 1- General scheme of the research

From the analysis and research it follows that within the framework of a comprehensive methodology for substantiating a rational list and volume of measures to ensure the vital functions of the evacuated population must be developed:

Methodology for assessing the current level of readiness of governments to receive evacuated population;

Methodology for substantiating a rational set of measures to provide life support for the evacuated population, taking into account the current level of readiness of governments to receive them.

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