

THE FAST TECHNOLOGIES FOR PROTECTION AGAINST FLOODS

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ABSTRACT

The floods produce the damages with disastrous effects at population and the social economic objectives. The climatic changes from the last century and the human activities conducted to floods with high frequency, in the high risk areas as in the areas without this kind of phenomena. The existent measures of defence against floods (regularizations of rivers, banking, protection zone of the of banks, etc.) could become inadequate in the extraordinary conditions. It is sufficient the exceed with several centimetres of the defence work quotas by the maximal calculated flow level, in order that the localities, in fields or socio – economic objectives to be flooded. The frequency of this phenomenon is increasing in Romania and in another areas of the World.

In such of situations the existence of the measure intercession with the fast technologies of defence against floods, could represent concrete solutions which head off the damages. Such of technologies are especially useful in the situation of the producing of the maximal floods with historical character and fast propagation.

The systems of fast protection (in real time) contain 2 distinct subsystems:

- *The informatical forecast and warning subsystem, which the function of warning the floods that exceed the flooding level and that establish automatically the risk areas, emplacements and the dimensions of the protection devices.*

- *The technological subsystem of execution of the protection dimensional commanded work of the informatical forecast and warning subsystem.*

This paper proposes to present theoretically and succinct few examples of fast protection of the socio – economic objectives in the imminent cases of floods.

INTRODUCTION

The Inundations produced by the flood from the hydrographic surface network produce inevitably economical damages and have an negative effect on the flora and fauna of the flooded area and have undesirable effects (human losses, the stress of the population exposed to this risk).

Due the climatical changes which happend in the last decades, it was observed an increase of the inundation frequency in our country and in globally, too.

Till present, the activities of research and development from this area were predominant oriented to the elaboration of the constructive measures with the preventive role: solutions of the beds of rivers, accumulations, polders, solutions of water management.

It must be also signalized the evident technical gaps which exist between the modern informatical systems of hydrological monitoring of the hydrographic basins and subbasins able to warn in actual time exceeding by the flood of the defence work quotas and the primitive technologies of intervention presently used.

In the conditions of the frequency and the intensity of the inundation phenomena increase, fast interventions for the temporary aggradation of the banks and/or dams in actual time become more important and opportune in the efforts of limitation and reduction of the inundations and their effects. The primary deficiency of the actual technologies of fast intervention in case of imminent inundation danger are:

- The low level of work mechanization;
- The high volume of used work;
- The low quality of executed defence work, result of the high speed of execution imposed by the purpose of this works and the high volume of the conversion cost realized the most often with the low qualified personal.

MATERIAL AND METHOD

For the goal of the defence against inundation, was elaborated a fast system of intervention capable to realize in actual time an aggradation of the banks and/or dams. The envisaged system is constituted by two dependented functional subsystems and these are:

A. The informatical forecast and warning subsystem, which has as basis the hydrological monitoring system of the hydrographic interested basin or subbasin. In this case, the monitoring system will be extended with the additional functions, namely:

- The determination of those floods which present potential danger of inundation, compare with the forecasted quotas of floods in the diverse downstream sections, with the quotas of defence of the areas which have to be protected;
- The automatical determination of the potential inundable perimeters and of the bank alignments which have exceeded quotas, using for this topographic digitized profiles;
- The automatical establish of the position in the plan of the protection screen and the necessary length and height;
- The automatical determination of the continuance of the defence working at the imposed proportions by situation and in different technological variant of execution;
- The determination of the dangerous flood propagation in the interested downstream sections;
- Determine the period propagation of the dangerous flood in the downstream sections.
- The automatic information of the authorities and institutions responsible with the defence with the next informations: the defends alignment, the dimension of the aggradation of each defends alignment, the time of execution for the defends works.

The organs of decision, disposing of the information revealed by the informatic subsystem of prognosis – warning decides the type of intervention that can be realized in the actual time line.

B. The technological subsystem of execution for the defends work

The high density of useful information provided by the subsystem of prognosis – warning impose, for the system efficiency, a mechanical execution, of high productivity, of the defends work against floods. With this purpose was elaborated a technical solution of defends that answers the requirements of the envisaged system, based on a mechanical technic in the execution of fast defends work. The technological solution of defends elaborated, it consists in the equipment of an prefabricated screen, of flexible type, built-in the dam or shore, with the help of an specialized mechanical equipment, and of the necessary aggradation that must be realized with the help of the screen to avoid inundation, it was chosen a screen with the maximal height of the aerial part of 100 cm and 50 cm for the constraining depth in the ground.

According to the hydrological studies made in these purpose, results that an aggradated screen with these dimensions can be used for defends in over 50% of the cases of floods that represent the potential danger of inundation. The details regarding the flexible screen were presented anterior [2], in these paper is presented the mechanical equipment of execution of the screen.

The technical solution, mechanized, for fast execution of an protection screen against inundations, it consists in an mechanical equipment carried by an tractor, capable of working with a speed of over 2000 m of screen assembled on the defends alignment, in 1 hour.

These high speed of execution of the screen assures, corroborated with the informatic subsystem of prognosis – warning against floods, the realization in real time line and quality of defends works imposed by the potential danger of floods.

The mechanical equipment of execution is formed by an vertical knife the opens in the ground an kerf in which we constrain the screen on an depth of 50..60 cm, for protection against pulling off and to eliminate the infiltrations of the water under the screen.

Behind the knife is fixed a rigid drum, heaving one of the walls high, fitted with an horizontal platform on the superior end and 2 soldiers that support the roller on which is coiled the flexible screen, membrane type, and the other wall of the drum has the height equal with the constraining depth of the screen, extra an assurance height that impeded the ground the get in to the drum (20 cm). The drum in opened at the posterior end and has installed in her interior un deviated ax, leaned with 45°. From the posterior end of the drum are articulated 2 compactor wheels, leaned in “V”. At the anterior end of the equipment is fixed un vertical support for the net roller of protection for the screen.

MATERIAL OF WORK

The prefab provided (that must be permanently in the endowment of the performer organizations) are:

- Roller with screen membrane, that must total the length of the defend alignment;
- Poles of support of the screen, fitted at the superior end with an loop, they being stoked on the drum platform;
- Arcs, fitted at both endings with catching hooks, that served for the elastic hanging of the screen on the pools;
- Metallic hooks for the hanging of the net.

The mechanical equipment of execution of defends is served by an work formation composed by 3 specialized workers and an driver of the carrier tractor (on caterpillars).

❖ An poll mechanic

❖ An mechanic for hanging arcs of the screen on the polls

❖ Am mechanic for safety net

The method of work is:

- The car is laied on the defends alignment, marked with poles.
- Is installed on the car holder, the roller with screen membrane, and the roller with the metallic protection net. On the drum platform are stocked the sustaining polls of the screen.
- The end of the membrane is introduced in the drum, is passed under the deviator ax and is extracted through the posterior kerf of the drum, in vertical position.

- The car is started, the equipment knife being inserted gradually in the ground at the constrain depth imposed to the screen (40..50 cm).
- Is introduced in the drum the first poll, being conducted through the ending of the drum in the ground, next to the membrane screen, operation executed by a worker, that has to be careful that the poll to be placed between the pears of kerfs hanging of the screen.
- The second worker imprints, if it is necessary 1 or 2 hits to the poll, and after he introduced the hanging arc through the poll's loop and catches the hooks to the screen.
- In the same time, the 3 worker observes the unreel of the safety net, it gets her closer to the screen and it hangs her to the polls with metallic hooks. The safety net is not constrained in to the ground, being recovered totally after the flood.

Observation: after the passing of the floods the arcs of hanging of the screen are pulled off, and with a tractor provided with a hydraulic arm in extracted, one by one the polls, for a future recycle.

CONCLUSIONS

1. The defends system proposed in the paper corroborates an informatic system with a technological execution system of defends works, being designed for fast interventions in the case of imminent danger of floods.
2. The defends technology elaborated is characterized by a high degree of mechanization, assures a high speed of work (2 km screen/hour) and uses a low personal (3+1 workers) and specialized on operations.
3. The good corroboration of the subsystem, of prognosis – warning, with the technological of intervention-defends, and their technical performances allows the decision organizations, and the optimal chooser of the defends cars, and the possibility of execution in real time line. The flexible structure of the screen confers a good adaptability at the requires produced by the floods.

REZUMAT

Inundatiile produc pagube cu efecte dezastruase asupra populatiei si obiectivelor socio-economice.

Schimbarile climatice din ultimul secol, datorate si activitatii umane, au condus la inundatii cu frecventa sporita atat in zonele potentiale (cu risc) cat si in unele lipsite de astfel de fenomene.

Masuri existente de aparare impotriva inundatiilor (regularizari de rauri, indiguiri, aparari de maluri, etc.) pot deveni insuficiente in situatii extraordinare.

Este suficienta depasirea cu cativa centimetri a cotei lucrarilor de aparare de catre nivelul

debitului maxim de calcul al viiturilor pentru ca localitati, terenuri agricole sau obiective socio-economice sa fie inundate. Frecventa acestor fenomene se inregistreaza din ce in ce mai des atat in Romania cat si in alte zone de pe glob. In astfel de situatii, existenta unor masuri de interventie cu tehnologii rapide de aparare impotriva inundatiilor, poate reprezenta solutii concrete care sa previna producerea pagubelor. Astfel de tehnologii sunt deosebit de utile in situatia producerii unor debite maxime cu caracter istoric si cu propagare rapida.

Sistemele de protectie rapida (in timp real) cuprind doua subsisteme distincte :

- subsistemul informatic de prognoza si avertizare, care are rolul de a avertiza viiturile care depasesc cotele de inundatii si care stabilesc automat zonele de risc, amplasamentele si dimensiunile dispozitivelor de protectie ;
- subsistemul tehnologic de executie a lucrarilor de protectie comandate dimensional de subsistemul informatic de prognoza si avertizare.

Prezenta lucrare isi propune sa prezinte teoretic si succint cateva exemple de protectie rapida a obiectivelor socio economice in cazuri iminente de inundatii.

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