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FEATURES OF FLOOD CONSEQUENCES PREDICTION TAKING INTO ACCOUNT THE ANGLES OF RIVER BANKS SLOPE AND SPEED OF ITS FLOW

(presented by Dr. Sc., prof. Chub I.A.)

The effect of the angle of the left river bank and its flow rate by the area of the longitudinal section of its flow during the passage of the flood are investigated.

Keywords: flood, flood area, rainfall intensity, the angles of the coast, the flow velocity, longitudinal section of the flow.

Formulation of the problem. Among the emergency situations (ES) natural character class 20500 [1] that bugged objects infra-structure of settlements, flooding a leading place on Num scrap of repetitions, covering areas as well as on the total mid-year economic damage that they cause.

The destructive effect of flooding and property damage are as underfire chamber areas damaged while residential and industrial buildings, roads, power lines with possible on-zhezheyu, destruction of other communal energy networks. At this year ent th formed the zone that includes the territory within which has served Xia flooding areas, damage to buildings, structures and other ob'yek-ing, accompanied by injuries or loss of life, pollution-ment environment.

Analysis of recent research and publications. In the works of studdzhuvanyh issues [2-4], assessment of the flood was carried out only in the light circuit section of the river (in the form of a triangle or trapezoid), leaving aside the study estimated impact on flood-D parametric angles shores at various flow rates possible rivers and precipitation in the area in a given area. Since angles banks and flow rate, especially for a large river length is variable characteristic, it was important to consider these characteristics in the calculations.

Formulation of the problem and its solution. The main task of research beater obtain basic characteristics of floods to further assess the proportion of municipal infrastructure damaged objectsri in case of flooding and develop recommendations for berehoukriplyuval-governmental and other preventive measures to reduce the impact of strikeing factors flooding. During research conducted calculations, if the purpose of which was to

evaluate the impact angle of inclination of the left bank of the river and syv-nosti-intensive rainfall to the area of the lumbar section of the flow during the floods of-origin. It assumed that section of the river has a trapezoid shape. Calculations carried out in the following sequence:

1. The determined cross-sectional area of the river to flood:

$$S_0 = 0{,}5 \cdot b_0 \cdot h_0, \text{ì}^{\ 2}, \tag{1}$$

where b_0 – the width of the river to flood, *m*; h_0 – the depth of river flooding, *m*.

2. Determine the water flow to flood:

$$Q_0 = v_0 \cdot S_0, \text{ì}^{\ 3} \cdot c^{-1}, \tag{2}$$

where v_0 – швидкість води у річці до повені, $м \cdot с^{-1}$.

3. Determine the water flow after rainfall and flood onset:

$$Q_{maõ} = Q_0 + J \cdot F \cdot 0{,}2778, \text{ì}^{\ 3} \cdot c^{-1}, \tag{3}$$

where J – rainfall intensity, $mm \cdot h^{-1}$; F – area of precipitation, km^2.

4. Determined lifting height of water in the river after passing flood:

$$h = \left\{ 2 \cdot Q_{max} \cdot \left[\frac{b_0 - a_0}{ctg\ n + ctg\ m} \right]^{5/3} \right\}^{3/8} - \left[\frac{b_0 - a_0}{ctg\ n + ctg\ m} \right], \text{ì}, \tag{4}$$

where m і n – angle of the left and right banks of the river under, m; a_0 – width of the bottom of the river, *m*.

5. Determine the area of the lumbar section of the river flow during the passage of floods:

$$S_{max} = 0{,}5 \cdot (a_0 + b), \text{ì}^{\ 2}, \tag{5}$$

where b – width of the river during flooding.

Using formulas (1) - (5) were calculated, which yielded the dependence presented in Fig. 1, 2.

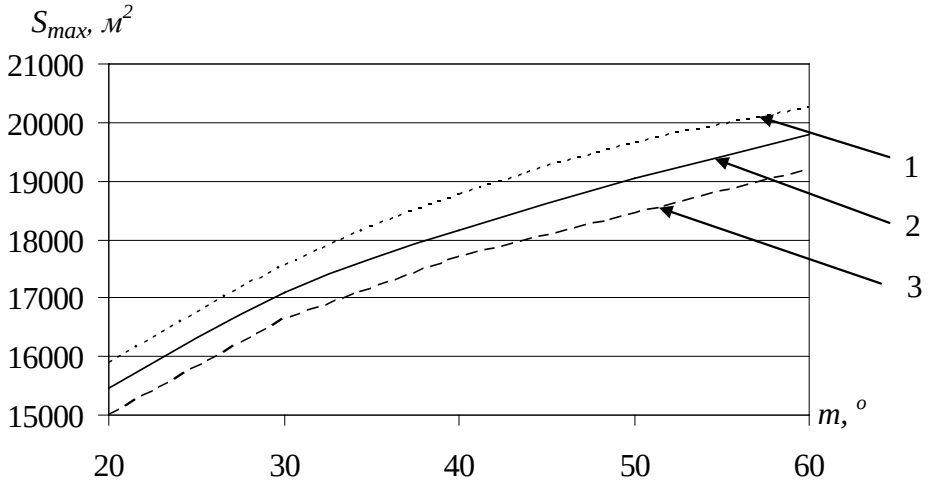

Fig. 1. Graph of the area of the lumbar section of the river flow during the passage of floods on the angle of the left bank: 1 - the rate of flow of the river to flood v_0 =1,5 m·s^{-1}, 2 – the rate of flow of the river to flood v_0 =1,0 m·s^{-1}; 3 – the rate of flow of the river to flood v_0 =0,5 m·s^{-1}

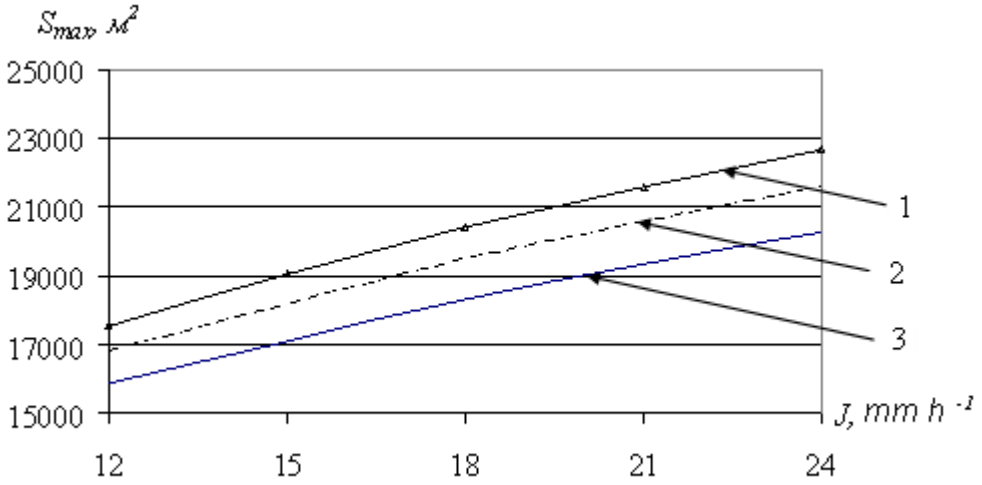

Fig. 2. Graph of the area of the lumbar section of the river flow during the passage of floods on the intensity of precipitation, 1 --angle on the left bank hylu m =50°, 2 – the angle of the left bank m =40°; 3 – the angle of the left bank m =30°

Thus for both dependencies recorded, offensive, no raw data: a_0 = 65 m, b_0 = 120 m, h_0 =5 m; n = 15°; F = 700 km^2. In order to build the first parameter depends additionally recorded J = 15 mm·h^{-1}, and to build a second - option v_0 = 1 m·s^{-1}.

Analysis of the graphs, the data in figure 1.2 leads to the following conclusions:

- with increasing inclination angle left bank of 20° to 60° sectional flow area of the lumbar during the passage of floods zbilshuyet subsequent to an average of 1.27 times, and for a flow velocity 1,5 m·s^{-1} area of the

lumbar section of the river flow during the passage of floods in 1000 m^2 is greater than the flow velocity 0,5 $m \cdot s^{-1}$;

- while increasing the intensity of rainfall from 12 to 24 $mm \cdot h^{-1}$ area of the lumbar section of the river flow during the passage of floods increased an average of 1.28 times, and for the angle of inclination of 50 ^{o} to the left bank area of the lumbar section of flow during the passage flood approximately 2,000 m2 is greater than the angle of 30 degrees.

Conclusions. The article shows that the increase in left bank angle and intensity of rainfall lead to an increase in the area of the lumbar section of the river flow during the passage of floods in 1.27 and 1.28 times respectively. Also proved that this area also increases high-s-bone of the river. For initial data considered this area for quick start-bones flow in 1,5 $m \cdot s^{-1}$ is greater than the rate of 0,5 $m \cdot s^{-1}$.

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Features of flood consequences prediction taking into account the angles of river banks slope and speed of its flow

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