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MORPHODYNAMIC CLASSIFICATION OF CHANNEL OF SUKIL RIVER

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Abstract. The morphodynamic classification of the Sukil river channel made it possible to determine the hydromorphological processes and to study the factors that determine them. The channel was classified according to the method of R.S. Chalov. Three main classification criteria were taken into account: the geomorphological type of conditions for the formation of the channel; the type of channel processes; the mophrodynamic type of channel.

According to the geomorphological type of channel-forming conditions, the channel is divided into the incised channel – located mainly in mountainous and semi-mountainous parts with a characteristic the narrow valley, laid in sandstones, siltstones, and argillites; confined channel – located in intermountain basins, with one bank of channel composed of bedrock, and the other – of Quaternary sediments; wide-floodplain channel – mainly located in the lower part of the channel on the Stryi-Zhydachiv basin, laid in the Quaternary deposits of loams and sands.

According to the type of channel processes, the channels with developed alluvial forms and without developed alluvial forms are dominant. Together they make up 2/3 of the channel. Other types of channels are wide-floodplain – characterized by slow flow and stable development of the meandering process, and rapid-waterfall – located in the upper reaches of the channel. The latter is characterized by a stormy current and the presence of numerous rapids made of boulders and wood.

There are 3 main morphodynamic types of the channel – meandering, branched, and straightforward, and 6 their subtypes. Meandering, incised channels are characterized by structural meanders, their shores are composed of hard rocks, mostly sandstones. The meandering confined channels are defined by the root bank in the apical part and the upper wing along the root bank, which leads to the formation of segmental and blockage convolutions. Meandering, broad-flooded channels are characterized by longitudinal displacement of meanders, their convolutions are segmented, rarely loop-shaped. The coefficient of meandering gradually increases from the mountainous part of the channel to the plain one (1.10–1.35). Branched type is represented by a single complex and floodplain-channel subtypes. The size of the islands that divide the channel into arms is from a few meters to 350–400 m. The straightforward type of channel is widespread and is 1/3 of the total length of the river.

Key words: channel type; straightforward; branched; meandering; incised; confined; floodplain.

МОРФОДИНАМІЧНА КЛАСИФІКАЦІЯ РУСЛА Р.СУКІЛЬ

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Анотація. Проведення морфодинамічної класифікації русла р. Сукіль дало змогу окреслити гідроморфологічні процеси, визначити чинники, що їх обумовлюють. Класифікацію русла виконано відповідно до методики Р. С. Чалова. До уваги брали три головні критерії класифікації: геоморфологічні умови формування русла; тип руслових процесів; динаміка русла.

За геоморфологічними умовами формування русла виокремлено: врізане русло – займає переважно гірську та напівгірську частини з характерною вузькою долиною, закладеною у пісковиках, алевролітах та аргілітах; адаптоване русло – займає міжгірські улоговини, один берег русла складений корінними породами, інший – четвертинними

відкладами; широкозаплавне русло –розташоване у нижній частині русла на Стрийсько-Жидачівській улоговині, закладене у четвертинних відкладах суглинків та супісків.

За типом руслових процесів домінуючими є русла з розвинутими алювіальними формами та русла без розвинутих алювіальних форм. Інші типи: широкозаплавний – характрена повільна течія та стабільний розвиток процесу меандрування; порогово-водоспадний – займає верхів'я русла поблизу витоку, відзначається бурхливою течією та численними порогами з валунів та деревини.

Окреслено 3 головні морфодинамічні типи русла – меандруючий, багаторукавний і відносно прямолінійний, та 6 їхніх підтипів. Для меандруючих, врізаних русел характерні структурні меандри, береги складені твердими породами, переважно пісками. Меандруючі адаптовані русла визначаються корінним берегом у привершинній частині та верхнього крила вздовж корінного берега, що спричиняє утворення сегментних та завальних звивин. Меандруючі, широкозаплавні характеризуються поздовжнім зміщенням меандр, звивини сегментні, зрідка петлеподібні. Коефіцієнт меандрування поступово зростає від гірської частини до рівнинної (1,10–1,35). Багаторукавний тип, представлений одиночним складним та заплавно-русловим підтипами. Розміри островів та осередків, що розділяють русло на рукави, становлять від кількох метрів до 350– 400 м. Відносно прямолінійний тип русла поширений повсюдно і становить 1/3 від загальної довжини річки.

Ключові слова: тип русла; відносно прямолінійний; багаторукавний; меандруючий; врізаний; адаптований; широкозаплавний.

Introduction. The riverbed is a complex hydrodynamic system, the functioning and appearance of which depends on external conditions and on its capability to rapidly and significantly modify itself in the case of a change in the impact of one of the components. Therefore, the structure of the riverbed is determined by such natural components as geological structure and relief, climatic and hydrological conditions, soil cover and vegetation, anthropogenic activity. All these factors cause differences in the development of both horizontal and vertical channel deformations, which leads to the formation of different types of channels.

Carrying out the typification of small rivers channels of the Carpathian region is important for understanding the course of channel processes in their various parts – from the mountain to the plain ones. The Sukil river, flowing through the Sukil subdistrict (Gerenchuk, 1968), occupies a unique subregion of the Skole Beskids, with areas of low-mountainous relief formed on the deposits of the Menilite suite (Kravchuk, 1999). The morphodynamic classification of Sukil channel types makes it possible to assess the degree of channel stability before the development of horizontal channel deformations and channel modifications. This makes it possible to predict possible negative consequences and take measures to prevent them.

The study of small rivers of the Carpathian region, hydrological and geomorphological processes therein are the main subject of the works of Yu.S. Yushchenko (2010, 2011); O.G. Obodovsky (2016, 2010, 2012); L.F. Dubis (1995, 2016); V. Shushniak (2000); I.P. Kovalchuk (1997, 2003); J.S. Kravchuk (1999, 2005); Yu.M. Vikhot and I.M. Bubnyak (2011).

Research method. For the purpose of the study, high-resolution aero- and spatial images have been interpreted for the period 2017–2019. An analysis of topographic maps for the 1980`s at scales 1:25 000 and 1:50 000 was performed, as well as an analysis of topographic maps for the 1870's–1880's at scale 1:75 000. The comparative

characterization has been carried out. In the low-water period of 2019–2020 a number of morphometric and morphological data were collected in the field, in accordance with the methodology of Professor K. Krzemień of the Jagiellonian University (Krzemień, 2012). They are required to verify interpreted data, as it is difficult to identify processes such as incision or erosion of the bedrock riverbank, and the presence of rapids or alluvium in the mountainous part of the basin, where the channel is often hidden under vegetation.

To classify the types of river channels the method of R.S. Chalov have been applied. According to it, the distinction of types has been carried out by several main blocks, which gives a complete understanding of the proceeding of channel processes. The first one is the type of channel processes. The channels of mountain, semi-mountain and plain rivers are divided into rocky rapid-waterfall, alluvial rapid-waterfall, channels with undeveloped and well-developed alluvial forms, and for plain channels there are sandy, pebble-boulder, plain rocky ones (Obodovsky, 2007; Chalov, 2017);

The second block includes geomorphological types of conditions for the formation of the channels, according to which they are divided into incised, confined and wide-floodplain ones. The basis for the selection are the geological and geomorphological features of the valley. And the selection criterion is the ratio of the width of the channel to the floodplain or the ratio of the width of the bottom of the valley (channel + floodplain) to the meandering belt.

The third block is the classification of morphodynamic types of the channel. Thus, the channels are divided into relatively straight (unbranched), branched into sleeves (multi-sleeved) and meandering (winding). The criteria for their selection are the shape in the plan, the configuration of the accumulative forms and the coefficients of the relationships between the length of the channel and the step of the convolutions. Comparing these parameters with the previous two, a subtype for each of the morphodynamic types of the channel can also be identified (Obodovsky, 2017; Chalov, 2007).

Results. Sukil is a river of mountain-plain type, which originates on the north-eastern slopes of the Zelemyanka ridge, but the source of the river Besarabka, which is larger by size, water discharges and the order is located on the south-western slope of the ridge Chorna Sihla and begins with the river Bryaza (Gerenchuk, 1968). It is from it that the classification of channel types is being made.

For a more detailed analysis of the classification, the Sukil channel was divided into three parts according to the type of channel processes. The first one is a mountain type on the section 1–15 from the source to the rapids around the village of Kozakivka (Fig. 1), the second one – starting from the rapids around Kozakivka up to the railway bridge in the village of Lysovychi 15–31 (Fig. 2), and the third one from the bridge to the confluence of Sukil and Svicha 31–35 (Fig. 3).

Thus, the mountainous part of the channel at section 1–15 is characterized by an incised V-shaped valley, the channel of which erodes the sandstones, argillites and siltstones of the Stryi, Yamna, Manyava, Bystrytsia and Menilite suites. The river valley is narrow (20–50 m) in the mountainous part, and increases in width up to 150 m when going out onto the intermountain basin. It is characterized by a steep right bank and a gentle left bank. Accumulative forms, as well as high floodplain, acquire significant development with entrance of the river onto the intermountain basin.

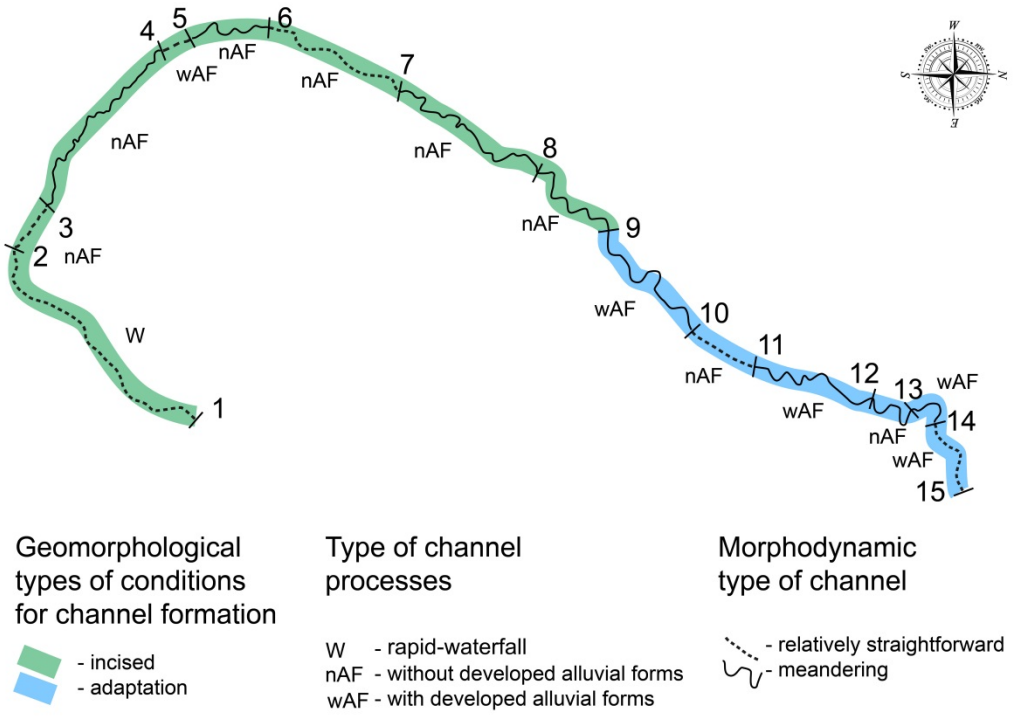

Fig. 1. Map of the distribution of morphodynamic types of the channel; type of channel processes; geomorphological type of conditions for channel formation in the mountainous part of the Sukil River

Рис. 1. Картосхема поширення морфодинамічних типів русла; типу руслових процесів; геоморфологічного типу умов формування русла у гірській частині р. Сукіль

Section 1–2 is 3.3 km long and is relatively straightforward, threshold-waterfall type of channel. It is characterized by rapid flow with cascades of small waterfalls formed by rocks and wood debris. This type was formed due to a significant slope angle – more than 25 ‰ and lack of sediment runoff. In its final part the channel changes its direction from S-W to N-W, which leads to its running parallel to morphostructures.

The channel at section 2–3 is also incised and relatively straightforward, the difference from the previous one is in the change of the type of channel process from threshold-waterfall to channel with undeveloped accumulative forms; this is due to a sharp drop in slope angle up to 10 ‰. Minor accumulations appear at the confluence of tributaries.

In the section 3–4 stretching of the river parallel to the Chorna Sihla mountain range and the increase in water volume have led to reformatting and formation of an incised, meandering type of channel laid in the bedrock (structural) and lack of developed alluvial forms. The coefficient of tortuosity is 1.13. The meandering belt is limited by a narrow valley and is 30–40 m in width. It should be noted that the 200 m long stretch on this section has been artificially straighten, as evidenced by space

imagery data and field observations. Accumulative forms begin to appear in the lower part, which leads to a further change in the type of channel.

The confluence of the Bryaza river with the Shchavyn river is located on sections 4–5, which led to the widening of the valley, the creation of a support and additional sediment removal into the main riverbed. As a result, the channel here is relatively straightforward with developed accumulative forms. At the stretch 300 m above the confluence, the channel changed its type. Thus, space images from 2009 show a natural morphodynamic type of channel – multi-sleeved, which is not typical for mountain rivers.

After merging, in the section 5–6 the channel becomes tortuous again, with two 30–70 m sidewalls at the beginning of the section. Their formation is associated with the removal of debris by the tributary. However, in general the channel is classified as the one without developed alluvial forms. The coefficient of tortuosity is 1.14, the width of the meandering belt is 100 m.

At the beginning of the section 6–7, the channel changes its direction to the N-E, crossing the mountain ranges perpendicularly, which caused an incised, relatively straightforward type of channel without expressed alluvial forms. The valley is narrow (10–20 m), V–shaped.

Section 7–8. The channel acquires the value of the level of meandering 1.12–1.15, which is the threshold for the emergence of this process and the transition of the channel from straightforward to tortuous. However, well-developed accumulative forms are not observed there. There are a number of unnamed tributaries that carry coarse-grained material into the channel.

At the section 8–9, the degree of curvature of the channel increases to 1.27. The channel is still meandering, without well-developed alluvial forms. There is an accumulation of pebble and gravel material in the channel, but it does not form full-fledged forms. Thus, section 8–9 is marked by a sharp widening of the valley up to 200 m and its going out onto the intermountain basin. As a result, an intense lateral and deep erosion – undercutting of the riverbank up to 100 m in length and 3–10 m in height, composed of sandstones, coarse-layered siltstones and argillites.

The channel on the section 9–15 is confined , which is due to its going out onto the intermountain basin. Its right bank is formed by the alternation of rocks of the Low-Krosno sub-suite, Low-Menilite, Bystrytsia, Vygoda and Yamna suites. In return, the left bank in the site of exposure is a floodplain terrace, which is clearly identified by the rolled pebbles of medium size (10–20 cm). Meanders are mostly segmental. A characteristic difference between different segments is the change in the type of channel process, which leads to the presence (9–10; 11–12; 13–14) or absence (10–11; 12–13) of accumulative forms in the channel.

Section 9–10 is marked by an increase in the degree of meandering up to 1.30 and in the width of meandering zone up to 300 m. Accordingly, the size of the undercut banks increased to 150x9 m. The average width of the channel here is 10–12 m, and the maximum one is 28 m. Channel widening led to a decrease in the transport capacity of the flow and the formation of large accumulative forms – sidewalls and cells ranging in size from 20 to 120 m. The presence of large (up to 80 cm) boulders in the channel indicates a significant increase in transport capacity during the flood period.

The channel at the section 10–11 (800 m long) is confined , relatively straightforward without well-developed alluvial forms. This is explained by the

increase in the channel fall up to 15 m / km and by the limiting role of erosion-resistant rocks of the right bank.

The channel in the section 11–12 is of a meandering type with an upper wing along the bedrock bank, which caused the formation of collapsed convolutions that abruptly change their direction by 90–100˚. Then the convolutions acquire a segmental appearance. The degree of development of the meander is 1.26, the width of the meandering zone has decreased here by 2 times compared to the section 9–10 and is 150 m. In return, accumulative forms have acquired a configuration more characteristic of the meandering type of the channel, the sidewalls 30–40 m in size on average being confined to the convex bank of the meander. Deep and lateral erosion dominates, the length of the undercut banks is 50–100 m, their height varies up to 2 m for the left bank and up to 25–30 m for the right bank.

Section 12–13 is of a meandering type with a bedrock bank at the top of the meander. The coefficient of meandering is 1.8, and the meandering zone is 150 m. Its difference from the previous one is in the absence of well-developed accumulative forms and in the presence of rapids that cross the channel at an angle of 140–160°. Undercut banks are low (from 2 to 6 m) with lengths of 60–160 m.

The channel at section 13–14 is also meandering with the bedrock bank at the top of the meander. The difference from the previous one is in the presence of well-developed accumulative forms – sidewalls 20–140 m in length. The channel in this area is interesting to study from several viewpoints. The first one is the change of the bedrock bank from the right to the left, thus one part of the channel has an incised type of valley foundation, while the other – an confined type. The second one is the presence of a cascade of rapids 80 m long, crossing the channel at an angle of 140–160˚. They create zones of deceleration and acceleration, which leads to the accumulation of material near one of the banks. The third one is the presence of the confluence of the rivers Sukil and Besarabka. A significant part of the material is carried out from the Sukil tributary during high water conditions, which leads to the formation of a removal delta which gradually transitions into the sidewall.

The channel on section 14–16 is relatively straightforward. Section 14–15 is located in a gradual narrowing of the intermountain valley. The accumulative forms located here consist of sidewalls and one island that forms a branch in front of a cascade of rapids of Yamna sandstones 60 m long, with a 2 m fall. Further, the channel in the section 15–16 is laid in the rocks of the Stryi suite, which leads to its straightening and the weak development of accumulative forms.

The semi-mountainous part of the river (15–31) (Fig. 2) is marked by the greatest variety of morphodynamic types of the channel: relatively straightforward, meandering, multi-sleeved; and of the geomorphological conditions of channel formation: incised, confined , floodplain ones. This contributes to intensive erosion-accumulation processes and to the opportunities for reformatting when high water conditions occur. The valley has V- and U-shape, its width varies in the range of 20–30 m for the incised channel, and expands up to 300–370 m for wide-floodplain one.

The section 16–17 of the channel goes out onto the intermountain basin, where it crosses the deposits of the upper and lower Menilite suites, which led to the acquisition of an confined, meandering type of channel with a bedrock bank along the apical part. The coefficient of meandering is 1.5, and the meandering belt decreases from 400 m at the beginning of the section to 120 m at its end; the convolutions are of the segmental

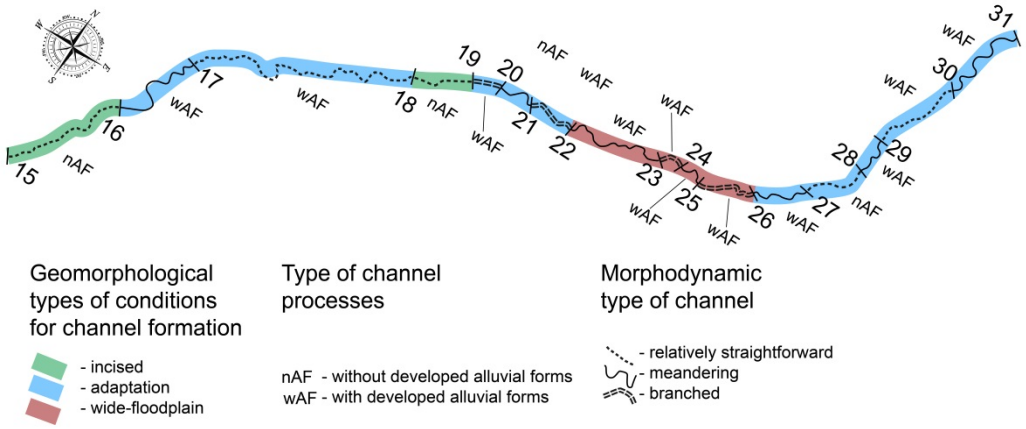

Fig. 2. Map of the distribution of morphodynamic types of the channel; type of channel processes; geomorphological type of channel formation conditions in the semi-mountainous part of the Sukil River

Рис. 2. Картосхема поширення морфодинамічних типів русла; типу руслових процесів; геоморфологічного типу умов формування русла у напівгірській частині р. Сукіль

type. The channel has well-developed accumulative forms ranging in size from 25 to 450 m. There are occasional branchings formed by cells and an island, but these forms are of lower rank, so such parts of the channel can't be classified as a distinct type. The height of the bank undercuttings is low (1–2 m), and their length is 100–200 m.

Section 17–19 is an confined (17–18) and incised (18–19) relatively straightforward type of channel with well-developed (section 17–18) accumulative forms as well as without such ones (18–19). Despite the fact that the channel is located in a relatively wide (600 m) and leveled valley, its banks are composed mostly of stable rocks, which complicates the development of the meandering process. At the beginning of the section, within the village of Polyanytsia, there are three cascades of rapids and another one near the village of Bubnyshche. All of them are composed of Yamna sandstones and cross the riverbed at an angle close to straight. At section 17–18 there are well-developed laterals and cells from 20 to 100 m in length; there is one macro-convolution with an island on its bend. The dominance of deep erosion over the lateral one is pronounced, the total length of the undercut banks is 1.8 km / 6.7 km of the total length of the river, and their height ranges from 1 to 3 m.

Sections of the channel 19–22 are located within the village of Tysiv and are characterized by successive alternation of multi-sleeved and meandering types of the channel. In this area the channel is confined , its development is limited by the slopes of the mountain ranges of the left bank. On sections 19–20 and 21–22, the channel is multi-sleeved with a single complex branching. The maximum width of the channel is 50–60 m, the branching is formed by numerous islands, the dimensions of which reach up to 270 m in length and up to 40 m in width. During periods of high water conditions, the number of sleeves can increase up to three due to the formation of an additional channel on the sidewall or in the middle of the island. The bottom of the channel at section 20–21 is composed of sandstones, the outcrops of which form

numerous rapids located at right angles to the channel. Multi-sleeve is due to the expansion of the channel and high floodplain up to 125 m, which leads to the loss of transport capacity of the current and to the accumulation of material, while the presence of thresholds creates zones of deceleration which contributes to the accumulation of sediments. The multi-sleeve in sections 21–22 is also caused by the widening of the valley and, in part, by the presence of a bridge, which supports contribute to the development of deceleration and accumulation zones.

Sections 22–27 are also characterized by a consistent interchange of meandering and multi-sleeve types of channels. According to the geomorphological type of laying, the channel is wide-floodplain, the width of the valley (channel + floodplain) in certain areas is 2 times larger than the width of the meandering and branching belt. The channel is semi-mountainous through its entire length, with well-developed accumulative forms ranging in size from 5 to 170 m in length. Sections 22–23, 24–25 are meandering with a longitudinal displacement of the meanders, while section 26–27 is meandering with the bedrock bank along the apical part, which renders it as confined . The average coefficient of tortuosity is 1.15, the meandering belt is up to 100 m wide. In high water conditions, additional channels are formed on the sidewalls of the channel of meandering type, which creates branchings along the entire length of the section 24–27.

Through the sections 27–28, the river flows inside the limits of the town of Bolehiv. Its course is confined, relatively straightforward with undeveloped accumulative forms. Farther downstream, the section 28–29 is characterized by the widening of the valley, which led to the formation of a meandering type of channel with a longitudinal displacement of meanders. The coefficient of tortuosity is 1.2, the meandering belt is up to 110 m wide, the convolutions are segmented. The sidewalls are formed at the convex banks of the meander, having a length of 120–170 m.

The channel section 29–30 is an confined , relatively straightforward type with well-developed accumulative forms, the average length of which is 60–90 m. Lateral and deep erosion are weakly expressed.

The plain part is confined to the Stryi-Zhydachiv basin and occupies sections 31–35 (Fig. 3). Its characteristic feature is the homogeneity of geomorphological conditions of channel formation (wide floodplain) and the type of channel processes (wide-floodplain). The channel is meandering practically through the whole section, the average value of the tortuosity coefficient is 1.3, except for the sections 32–33 and 34–35, which are relatively straightforward. The width of the valley varies between 150–650 m and is, for the most part, limited by a protective dam.

The channel in section 30–31 is meandering with developed alluvial forms, its length is 2.3 km. The average value of the meandering coefficient is 1.35, the meandering zone is limited by the slopes of the Morshyn upland (the channel is confined) and is 200 m wide. The sidewalls are located at the convex bank and are covered with vegetation.

Farther downstream, the channel at section 31–32 is also meandering, with developed accumulative forms. The difference from the previous one is another geomorphological type of conditions for the formation of the channel – wide-floodplain. The river flows through the Stryi-Zhydachiv basin, which contributes to the longitudinal displacement of the meanders and the expansion of the meandering belt up to 300 m. The sidewalls are confined to the convex bank of convolutions and range in

size from 30 to 470 m in length. A characteristic feature of all accumulative forms is the gradual increase in vegetation since 2015, which is a sign of the absence of severe floods.

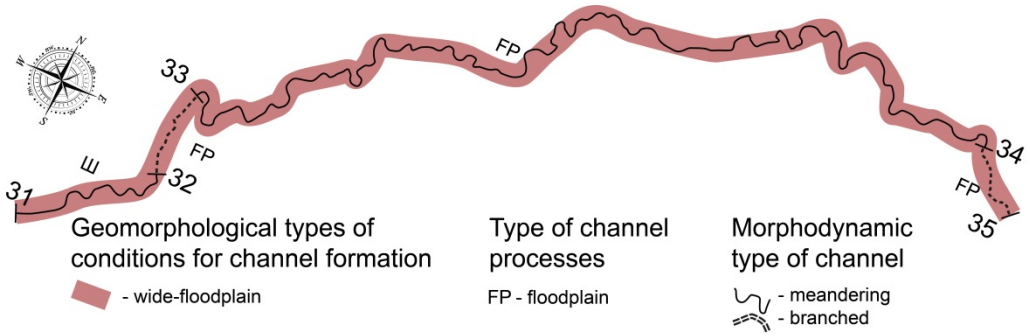

Fig. 3. Map of the distribution of morphodynamic types of the channel; type of channel processes; geomorphological type of conditions for channel formation in the plain part of the Sukil River

Рис. 3. Картосхема поширення морфодинамічних типів русла; типу руслових процесів; геоморфологічного типу умов формування русла у рівнинній частині р. Сукіль

Section 32–33 is a wide-floodplain, relatively straight type of channel with a bilateral floodplain. The information of the Austrian 1:75 000 topographic map and the data obtained by spatial images interpretation indicate the presence of old oxbows, which is a reason to assert the meandering type of channel in the past.

The section of the riverbed 33–34 is the longest one (18 km). The type of channel is wide-floodplain, meandering with a longitudinal displacement of the meander. The coefficient of tortuosity is 1.25, the meandering belt averages 150–200 m with a maximum value of 300 m. The significant number of oxbows on the first floodplain terrace indicates the intensive development of meandering in the past. However, reclamation (construction of canals) and anti-flood (construction of dams) measures have slowed down and limited this process and caused the lack of active development of accumulative forms.

The last section 34–35 is 1 km long and is located before the confluence with the river Svicha. This is a wide-floodplain, relatively straightforward type of channel with a bilateral floodplain. At its confluence with Svicha the filling delta is formed.

Conclusions. According to the type of channel processes, geomorphological conditions of channel formation, and morphodynamic classification, the channel of Sukil river is divided into 34 sections beginning from its source and up to its confluence with Svicha river.

Thus, according to the course of channel processes, the channel is divided into relatively equal parts. Mountain type (32.9%) is located in the upper part of the basin from the source to the village Kozakivka. It is characterized by rapid turbulent flow, the predominance of deep erosion over the lateral one, sometimes the absence of a high floodplain. The semi-mountainous type takes 37.2% of the length of the channel. It is located between the village of Kozakivka and the beginning of the river's going out onto the the Stryi-Zhydachiv basin. A characteristic feature is the smaller slope of the

channel and the specifics of the flow, having the features of the plain one in the interfluve period, and the mountainous one during floods. The above types are subdivided into rapid-waterfall; with well-developed alluvial forms and without developed alluvial forms. Thus, sections 2–31 have alternating channel types with developed and without developed alluvial forms, and section 1–2 has a rapid-waterfall type of channel. The plain type of channel processes accounts for 29.9% of the river length. This area is located in the Stryi-Zhydachiv basin – from the town of Bolekhiv to the confluence of the Sukil and Svicha rivers. It is characterized by a slow flow, the small size of alluvium, the predominance of sand-boulder and sand-clay fractions.

The geomorphological type of channel formation conditions is decisive in the development of channel and morphodynamic processes. According to this, 24.5% of the river channel is incised, mainly in the mountainous part of the basin. The confined channel takes 38.9% of the total length of the river and is confined to the intermountain basins and Morshyn upland. The wide-floodplain type of channel formation, as well as the plain type of channel process located in the Stryi-Zhydachiv basin at the sections 31–33 of the channel, takes 36.3% of the total length of the river. It was formed in Neogene deposits of clays, argillites, siltstones and sandstones. Its characteristic feature is the width of the floodplain being several times larger than the width of the channel.

The abovementioned conditions became the basis for morphodynamic typification of the Sukil river channel. Thus, the relatively straightforward type of channel occupies a third of the length of the river – 32%. It is mainly confined to the mountain type of channel processes and incised and confined types of channel formation. The multi-sleeved type is scarce – 4.6% and is located in the intermountain valley within the village of Tysiv – town of Bolekhiv. It was formed as a result of seasonal changes in flow parameters: significant transport and erosion capacity in high water conditions and calm flow at the low water period. The meandering type of the channel is related to all types of channel processes and is represented in all types of conditions of channel formation, which makes it the most common – 63.4%.

Thus, the classification of types of channels of Sukil river largely reflects the peculiarities of channel processes, and is the basis for further studies of fluvial processes: the study of sedimentation, the assessment of possible negative natural processes and elaborating recommendations for measures to prevent them.

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