



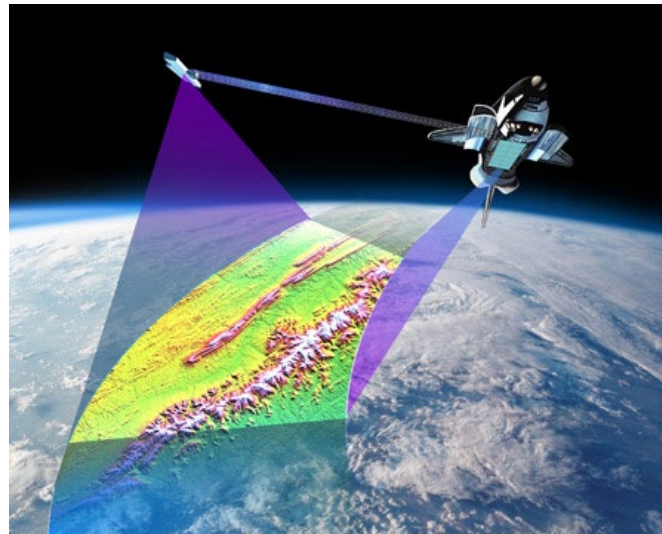
Razzakov Kyrgyz State Technical University

GIS for thematic mapping of the Issyk-Kul Lake basin

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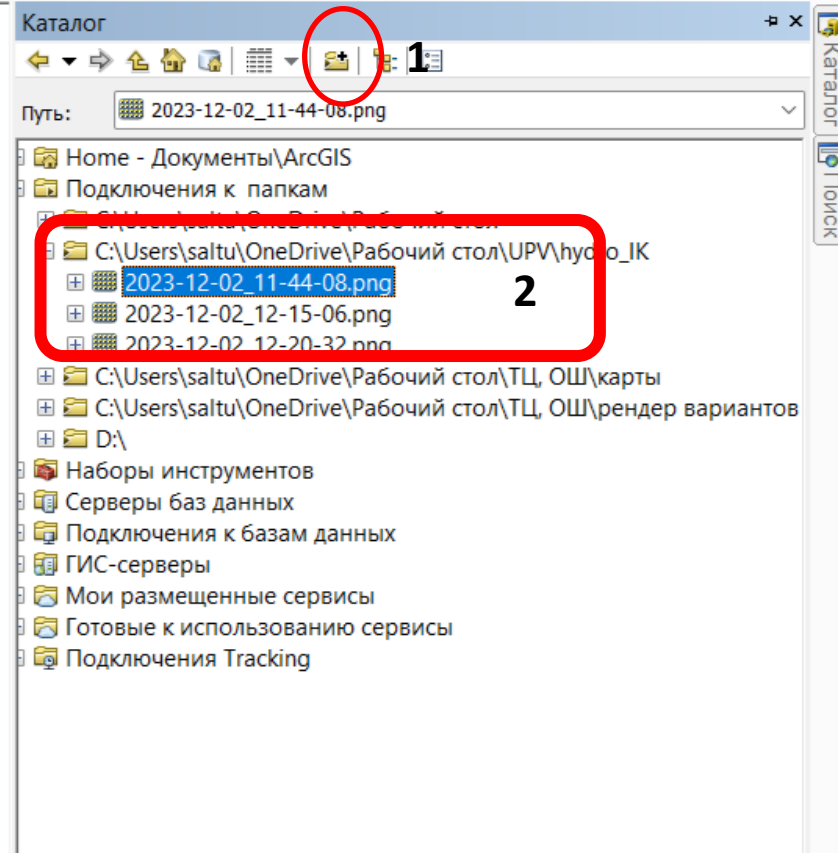
On this practical work I wanted to tell and show in practice the creation of a thematic map of the basin for example Issyk-Kul Lake using SRTM images in the program complex ArcGIS Map.

An SRTM image is a satellite image of the Earth's surface created using radar equipment. Therefore, the exact outlines of the Earth's surface cannot be seen on it. The purpose of such images is to display elevation data. This SRTM image can be downloaded from : <https://earthexplorer.usgs.gov/>



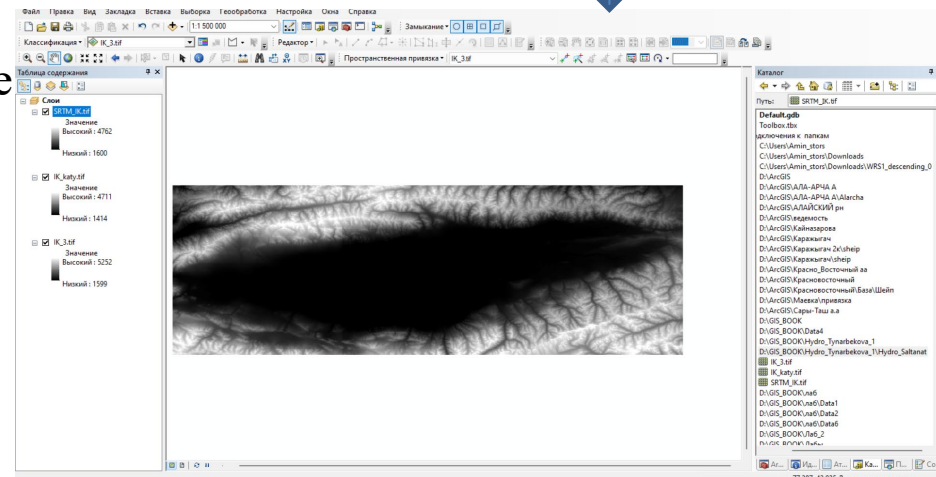
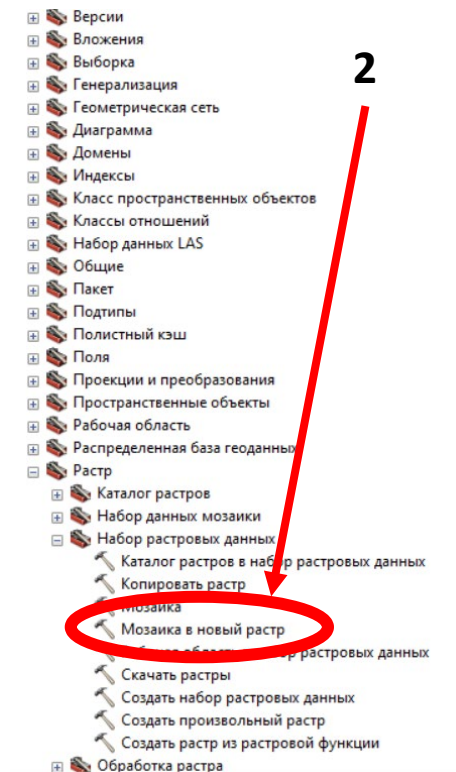
To save you and me time I created a folder with SRTM data of Issyk-Kul Lake in advance. The data is saved in the **UPV_KSTU_Saltanat** folder, which is located on the desktop.

1. First, let's open ArcGIS Map and
- The second step is to load our data.



- Next, we make one image out of three images using ArcToolbox

Next, open the raster tool and choose to create a new mosaic.





- Now we cut using the Cut tool.

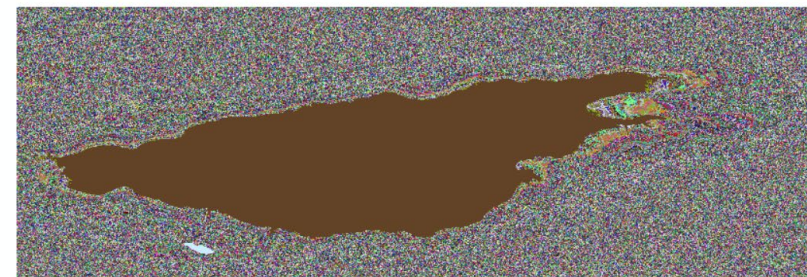
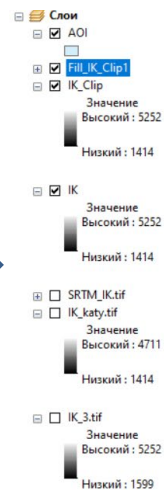
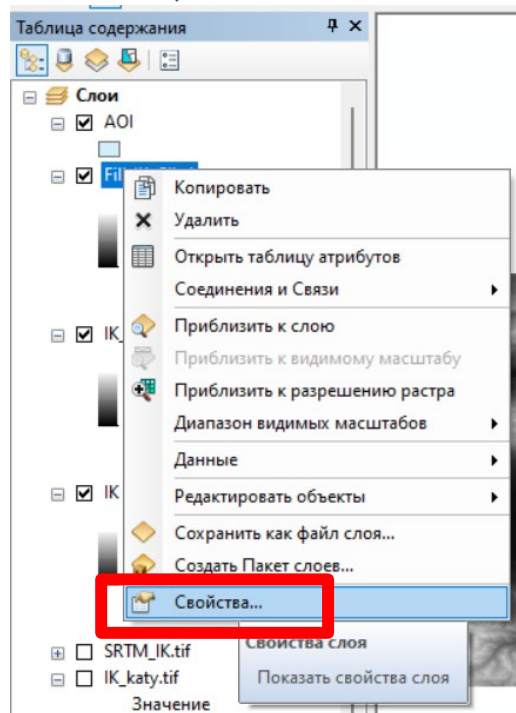
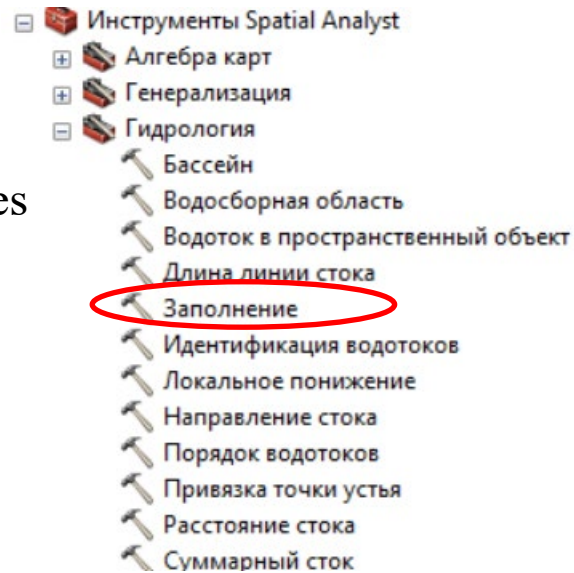
The screenshot shows the ArcToolbox interface on the right and the 'Вырезать' (Cut) tool dialog box on the left. The dialog box is titled 'Вырезать' and contains the following fields and options:

- Входной растр:** IK
- Выходной экстенс (дополнительно):** AOI
- Прямоугольник:** Input fields for Min. X, Макс. X, Min. Y, and Макс. Y. The values are: Min. X: -450359962737,049500; Макс. X: 450359962737,049500; Min. Y: -450359962737,049500; Макс. Y: 450359962737,049500. There is an 'Очистить' button next to the Max. Y field.
- Использовать входные объекты в качестве Вырезающей геометрии (дополнительно)**
- Выходной набор растровых данных:** D:\GIS_BOOK\Hydro_Tynarbekova_1\Hydro_Saltanat\SRM_Saltanat.gdb\IK_Clip
- Buttons: OK, Отмена, Параметры среды..., Показать Справку >>

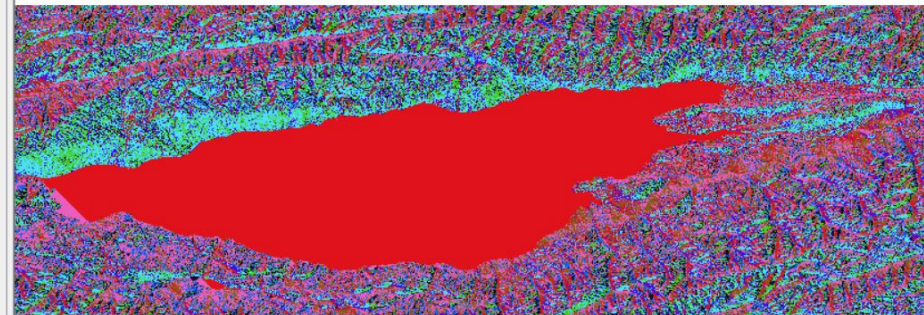
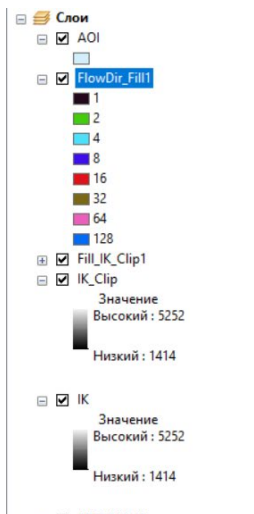
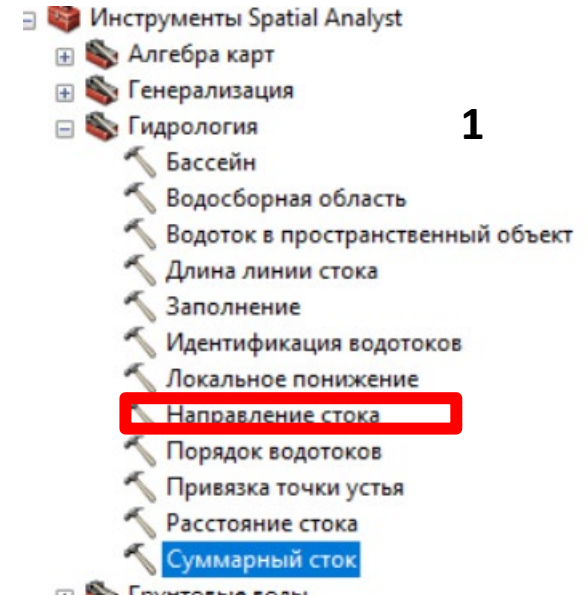
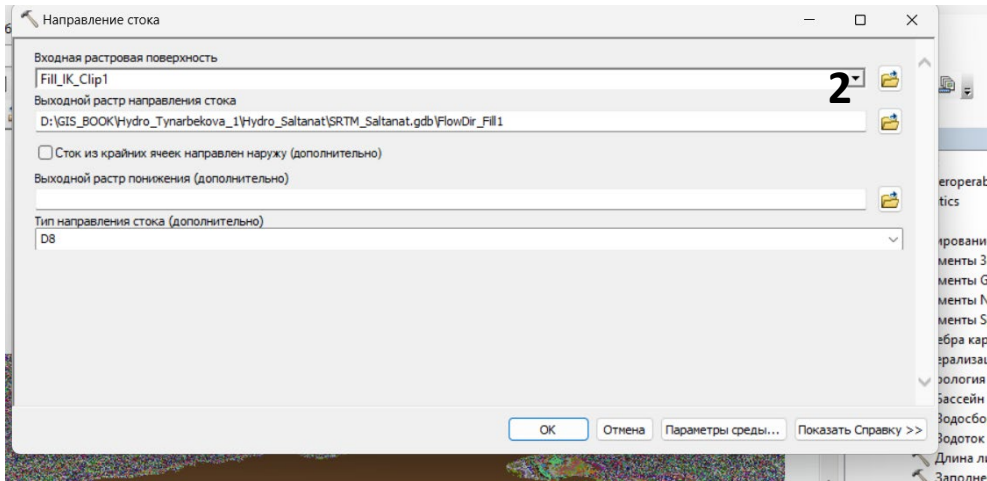
The ArcToolbox on the right is expanded to the 'Обработка растра' (Raster Processing) folder, where the 'Вырезать' tool is circled in red. A large number '1' is placed to the right of the ArcToolbox, and a large number '2' is placed to the right of the dialog box.

- Next, fill the cells using the Fill tool

Then change the style using the properties command



Create a flow direction using the flow direction tool



Now calculate the total runoff using the Total Flow Accumulation tool

Инструменты Spatial Analyst

- Алгебра карт
- Генерализация
- Гидрология
 - Бассейн
 - Водосборная область
 - Водоток в пространственный объект
 - Длина линии стока
 - Заполнение
 - Идентификация водотоков
 - Локальное понижение
 - Направление стока
 - Порядок водотоков
 - Привязка точки устья
 - Расстояние стока
 - Суммарный сток**
- Грунтовые воды

1

The screenshot shows the ArcMap interface with the 'Суммарный сток' (Total Flow Accumulation) dialog box open. The dialog box has the following settings:

- Входной растр направления стока: FlowDir_Fill1
- Выходной растр суммарного стока: D:\GIS_BOOK\Hydro_Tynarbekova_1\Hydro_Saltanat\SRMT_Saltanat.gdb\FlowAcc_Flow1
- Входной растр весов (дополнительно):
- Тип выходных данных (дополнительно): FLOAT
- Тип направления стока (дополнительно): D8

The Table of Contents shows the following layers:

- AOI
- FlowDir_Fill1 (Legend: 1, 2, 4, 8, 16, 32, 64, 128)
- Fill_IK_Clip1
- IK_Clip (Значение: Высокий : 5252)
- FlowAcc_Flow1 (Значение: Высокий : 3,23821e+06; Низкий : 0)
- FlowDir_Fill1 (Legend: 1, 2, 4, 8, 16, 32, 64, 128)
- Fill_IK_Clip1
- IK_Clip (Значение: Высокий : 5252)

The main map area shows a dark, mostly black map with some red and blue features. The ArcToolbox is visible on the right side of the screen.

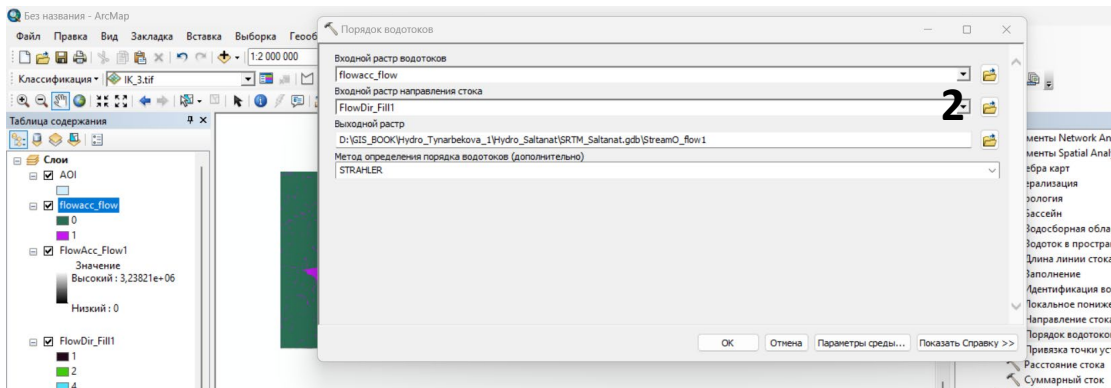
3

- We enlarge the river system using the image calculator with a selection of rivers greater than or equal to 1000 using the Map Algebra tool.

The screenshot illustrates the process of enlarging a river system in ArcGIS. It is divided into three numbered steps:

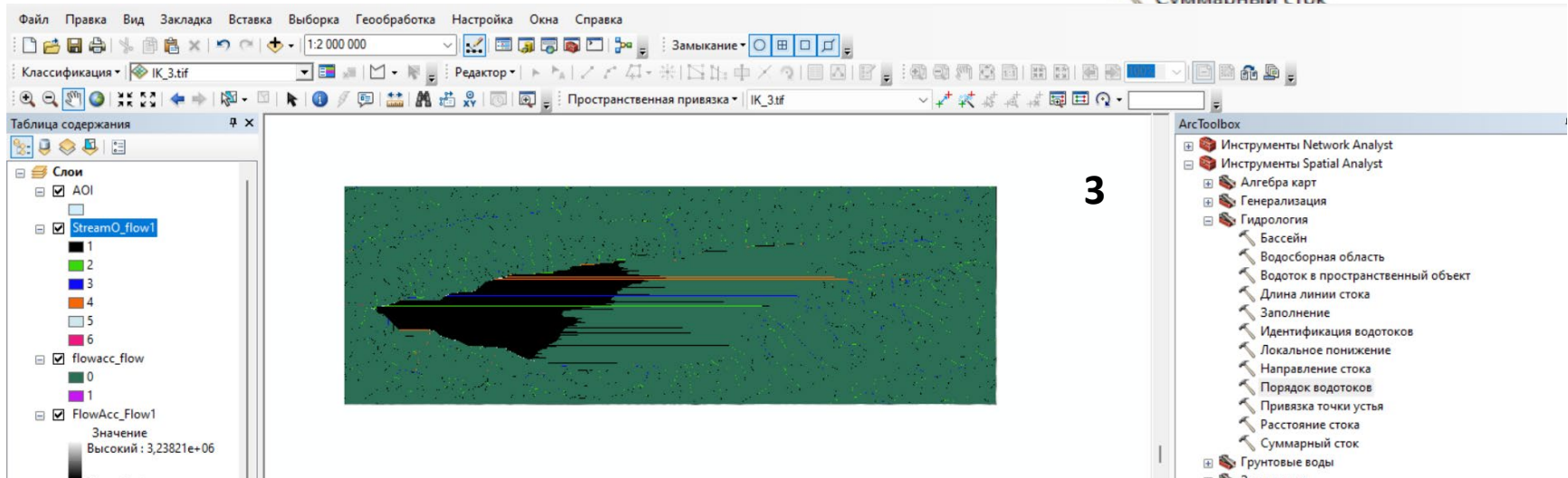
- 1**: The ArcToolbox is open, and the **Калькулятор раstra** (Raster Calculator) tool is highlighted with a red box.
- 2**: The Raster Calculator dialog box is shown. The expression `"FlowAcc_Flow1" >= 1000` is entered in the **Выражение Алгебры карт** (Map Algebra Expression) field. The **Слои и переменные** (Layers and Variables) list includes `FlowAcc_Flow1`, `FlowDir_Fill1`, `Fill_IK_Clip1`, `IK_Clip`, `IK`, `SRTM_IK.tif`, and `IK_katy.tif`. The **Выходной растр** (Output Raster) is set to `d:\gis_book\hydro_tynarbekova_1\hydro_saltanat\srtrm_saltanat.gdb\flowacc_flow`.
- 3**: The final result is shown in the main map window. The **Таблица содержания** (Table of Contents) shows the `flowacc_flow` layer with a legend where 0 is green and 1 is purple. The map displays a purple area representing the enlarged river system on a green background.

- We are now determining the order of the waterways



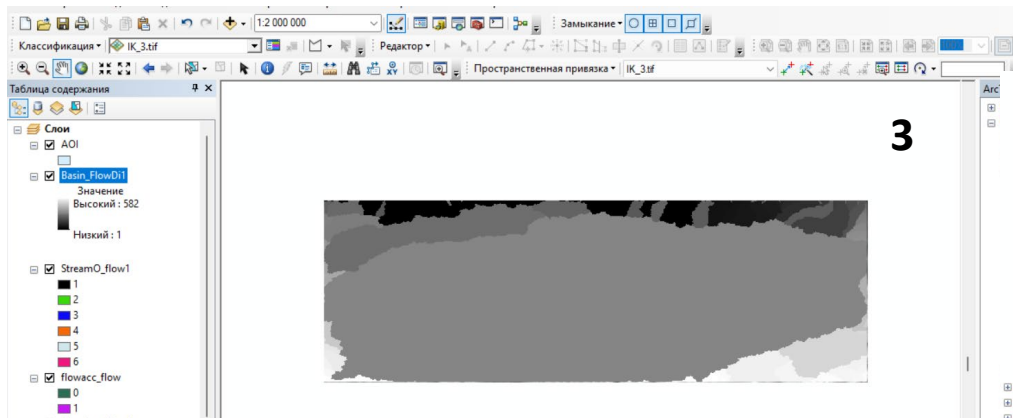
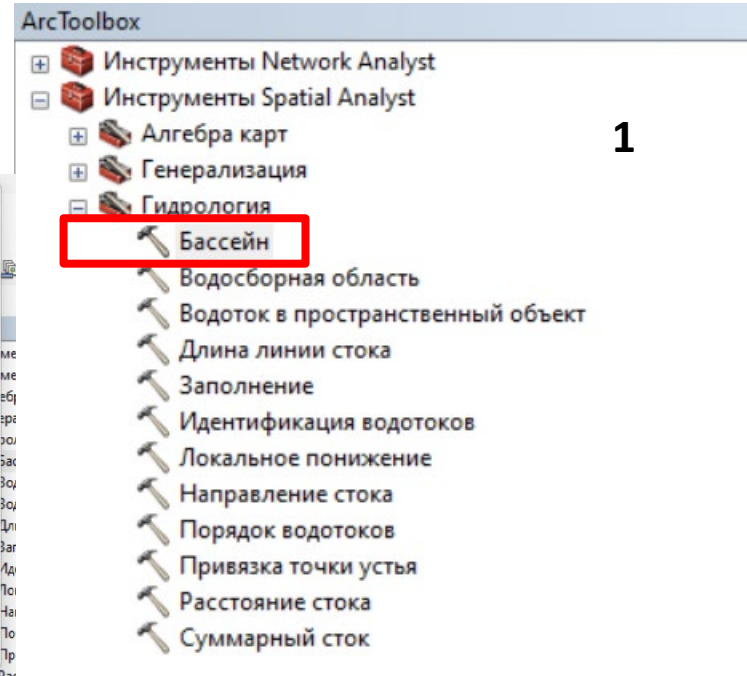
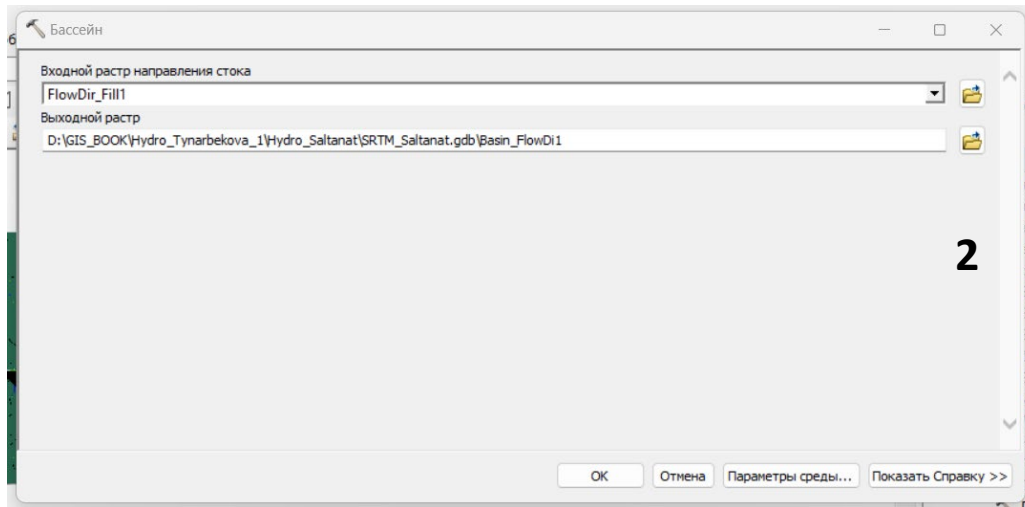
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 - Суммарный сток

1

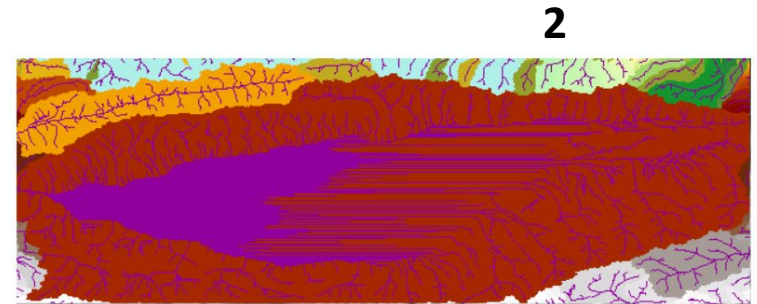
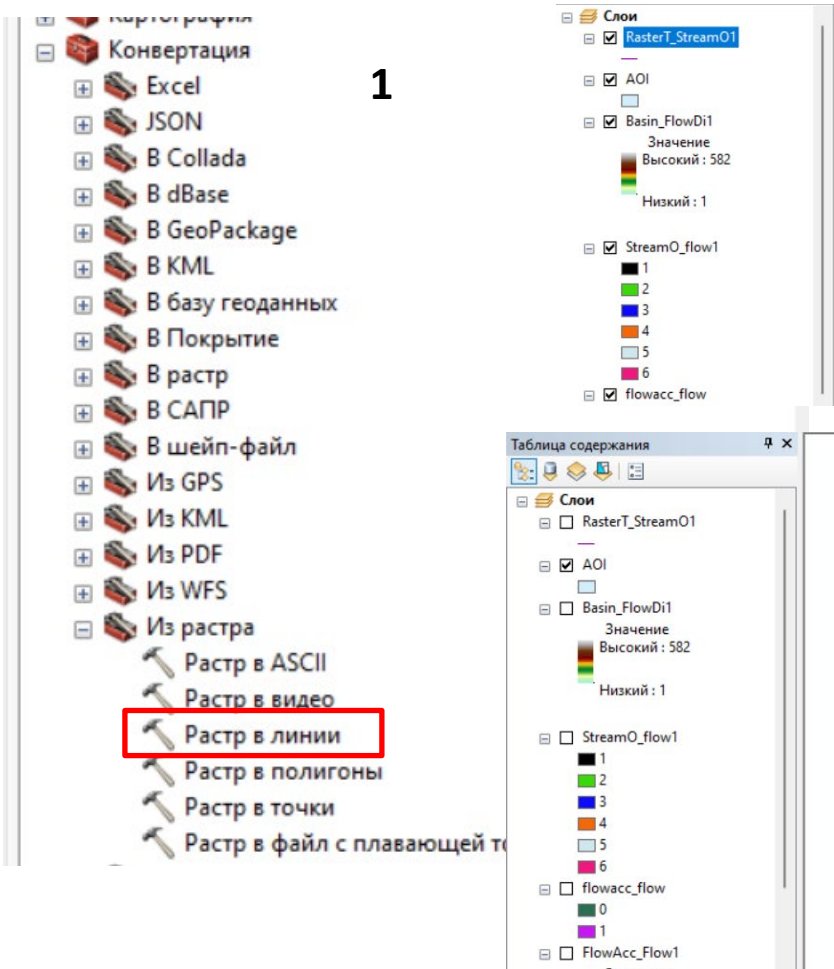


3

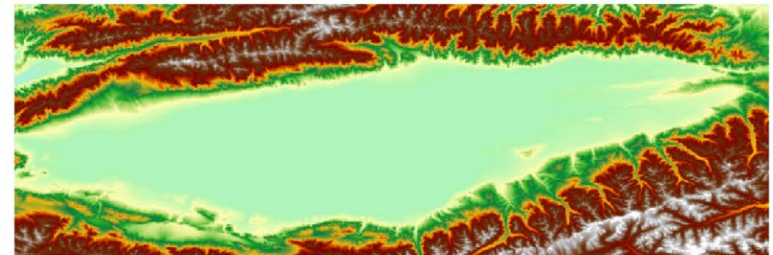
- Now model the pool using the Pool tool



- For design, convert our file to a vector using the Convert tool



Final Result





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**GRACIAS
POR SU
ATENCIÓN!!!!!!**