

Learning Material

Aralkum - A Lake Disappears

Grades 8-9

Exercises

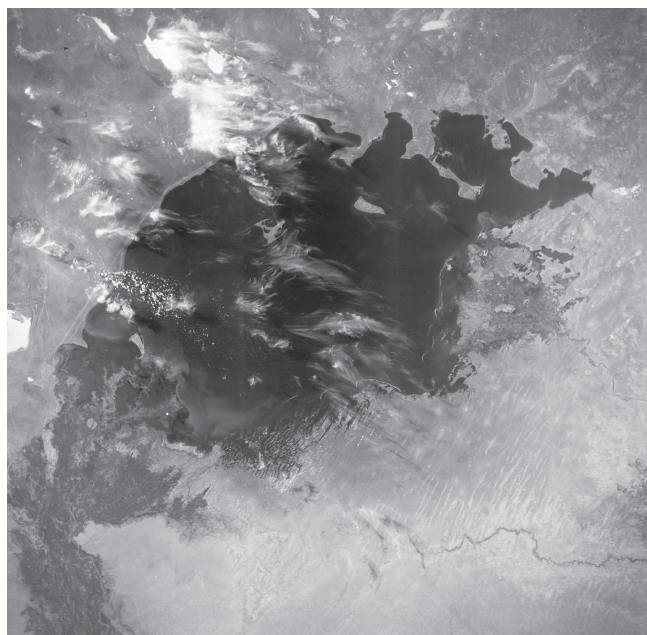
Introduction: How did the Aral Sea turn into „Aralkum“?

Many atlases still depict the outline of the Aral Sea as it was in 1960. However, those images are no longer accurate. Parts of the former Aral Sea now belong to Aralkum (-kum meaning "desert"). With the aid of ISS videos and satellite images, scientists are not only able to research the state of the former Aral Sea area, but can also distinguish between seasonal and global trends. You can use the app "From Aral Sea to Aralkum", which provides you with the scientific tools to complete the tasks below and predict how the Aral Sea will evolve.



Aralkum-App:

Scan the QR-Code or download at <https://play.google.com/store/apps/details?id=com.ColumbusEye.Main>



Marker 1: Aerial image from 1964.

Start the app and aim the camera at the markers. Tap the picture to start the video on the evolution of the Aral Sea from 2000 to 2016. Source: NASA



Marker 2: Aral Sea as seen from the ground and in the ISS video of 2016.

Start the app and aim the camera at the markers. Tap the picture to witness the current ISS-flyover of the Aral Sea.

Tasks

1. Get an overview of the situation at the Aral Sea by starting the app and aiming the camera at markers 1 and 2 on page 1. Tap the pictures to start the underlying videos.

- Describe the current situation and the historic development of the Aral Sea. Use the images of the Landsat programme from 2000-2016 in the video of marker 1. Which sections are changing?
- What can you see in the ISS video of marker 2? Elucidate what strikes your attention, when comparing the ISS video to the ground images and the other satellite images.

2. Why does the Aral Sea dry out? Use materials 1 and 2 and the atlas to get information about the region.

- Why was the Karakum Canal built? What is and was the water of the canal used for?
- Why are the rivers Syr-Darja and Amu-Darja important to the Aral Sea? What happens when water from the Amu-Darja is diverted by Karakum Canal?

3. How fast is the Aral Sea changing? Use the app and marker 3 on page 5.

- Measure the shortest distance from the city Muinak to the lakefront in the years 2001, 2009 and 2017. Use the app to display the shorelines and check the distance to the city with a ruler.
- Compare the changes from 2001 to 2009 and from 2009 to 2017. Does the Aral Sea change consistently, faster or slower? Make a guess: what will the Aral Sea look like in 2025?

4. Which problems stem from the lakes recession? Consult your answers for questions 1-3.

- The newspaper article "The Poison Underneath" is from the year 1988. Is the situation today exactly as it was described in the article?
- Make a list describing the possible consequences of the draining of the Aral Sea for humans and the environment. Discuss with your classmates!

Material 1: Der Spiegel 5/1988 (excerpt)

The Poison Underneath

The Aral Sea in the Soviet Union is drying out – with drastic consequences for nature and humanity. Fishing boats full of carps and roaches were chugging into the harbours. Reed, cotton and rice were bending in the wind.

That is an image of the past. Today, the ships are corroding between dunes, miles away from any water. The reed is withered and sand storms are blowing over the cotton and rice fields.

The reason is an enormous ecological disaster, the victim of which is one of the biggest inland waters, the Aral Sea.

The lake, originally 120 times bigger than Lake Constance, is drying out. Since 1957, the depth of the lake has dropped by half and now stands at only 12 meters. The shore has retreated by up to 100 kilometres in some spots. The formerly lively harbour Muinak is now more than 10 kilometres away from the waterline.

In total, the surface decreased by 37%. In 2010, soviet scientists estimate, the Aral Sea will be gone if the retreat continues.

Material 2: Fertile Desert (fictitious news article)

Sozialistische Arbeiterzeitung

Fiktive Sonderausgabe

Tageszeitung der Kommunistischen Partei

Sonderausgabe
1985

Einzelnen ausführliche Informationen: „Der rote Stern“
2. – Weltweit monatlich veröffentlicht. – Auflage 2. – Weltweit
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Fertile Desert

A major project of the initiative „reshaping nature“ secures the independence of the USSR from cotton imports: the success story of the 1150 km Karakum Canal



Turkmen SSSR: In 1967, the world's longest artificial watercourse was completed. Until today, irrigated land in the Turkmen SSSR has extended by 600%. The Karakum Canal, which extends from Boshaga to Randschick, provides water to agricultural holdings on both sides of the canal. The supply is inexhaustible and available all-year. The basins are filled through pumping stations in the summer, when the water level of the Amu-Darja is at its peak. The cotton production as the most important good of the USSR has almost

tripled until 1981. To irrigate the cotton farms, almost 26.000 m³ water per year and hectare is diverted from the Amu-Darja. Nowadays “only” 12.000 m³ water per year and hectare reach the cotton farms. If the evaporation caused by the dry-ardently climate in the summer was lower, production could be increased even further. Because of cost concerns, a sealing of the canal is not planned. However, it could be due, if an extension of the irrigated land is necessary to further ensure an independence from imports.





KOMMUNISMUS IST SOWJETMÄCHT. PLUS ELEKTROFIZIERUNG

Marker 3: Satellite image from 2017 (Sentinel)

If you start the app and aim the camera at the marker, the shorelines of the Aral Sea between 2000 and 2016 will show up. Tap the picture to start a video on the shoreline development. Tap again to pause. You can see the year in the upper right corner.

The marker itself shows an up-to-date Sentinel image from 2017. Sentinel 2A and 2B are two identically constructed satellites, which orbit the earth at the height of 786 kilometres. They take high-resolution multispectral pictures of the earth's surface. One pixel equals 10x10 metres.

