



TEACHER GUIDE | 45 MINUTES

Glaciers climate change and water access

English B1+/B2 | Ages 15-18 | EU4Blue

Students investigate how glacier change affects seasonal water supplies and make a justified decision for a fictional mountain community. The lesson connects scientific understanding with fair, practical action.

Learning outcomes

Students can explain why faster melting may increase runoff at first but reduce it later; connect water availability with one human activity; and distinguish adaptation from mitigation.

Lesson sequence

Time	Activity	Outcome
0-5 min	Think-pair-share: If glaciers melt faster, will people always have more water? Collect predictions.	Initial hypotheses
5-15 min	Read p. 2; underline the change over time. Answer tasks 1-2 in pairs.	Causal explanation
15-23 min	Read the case on p. 3. Calculate the water gap and explain who could be affected.	Data interpretation
23-37 min	Groups of three choose an action package. Prepare a 45-second council pitch.	Justified decision
37-42 min	Two or three groups present; peers challenge one trade-off or assumption.	Critical comparison
42-45 min	Discuss the opening question again and clarify the distinction between adaptation and mitigation.	Shared conclusion

Preparation and differentiation

Print pp. 2-3; retain p. 4 as the answer key. Provide pens and a calculator. No internet, social-media account or specialist equipment is needed.

Support: allow labelled arrows and use "At first ...; later ... because ...". Challenge: explain why a reservoir redistributes water over time but cannot create it. Offer a written pitch instead of public speaking.

Ocean Literacy links: climate-ocean interactions and human connections (principles 3 and 6). EU4Blue themes: Climate Change & Water and Water, Health & Society.



STUDENT WORKSHEET 1

How can melting ice lead to less water

Name _____ Date _____

Read and investigate

High mountains are sometimes called natural water towers. They receive rain and store water as snow and ice. Snow usually melts seasonally. Glaciers are longer-lasting stores of ice, formed where accumulated snow becomes compressed over many years. Water from mountains supplies rivers and supports people and ecosystems downstream. Mountain water is not all glacier meltwater: rain and seasonal snowmelt matter too. [1]

In a glacier-fed catchment, meltwater can be especially important during warm, dry periods. As temperatures rise, a glacier may initially release more meltwater. However, if it keeps losing ice, its store becomes smaller. After a point known as peak water, the glacier can produce less annual runoff because less ice remains. Different glaciers reach this point at different times. A hot summer does not therefore guarantee more water in the long term. [2]

Changes in water supply affect more than drinking water. Farmers need water for crops, and hydropower depends on flowing water. Aquatic ecosystems also need suitable flows. The consequences depend on rainfall, water demand, infrastructure and management. Meltwater from land ice can eventually reach the ocean and contribute to sea-level rise. [1, 2]

Communities can adapt by repairing leaks, improving irrigation and planning water use fairly. Mitigation addresses the causes of climate change, for example by reducing greenhouse gas emissions. Both approaches matter, but a local water-saving action cannot by itself stop global glacier loss.

Word bank: downstream = further along a river; catchment = land draining to a river; runoff = water flowing from an area; irrigation = supplying crops with water; trade-off = a benefit with a cost or disadvantage.

1 Explain the apparent contradiction

Why can faster melting mean more water at first but less water later? Use “at first”, “later” and “because”.

2 Connect the effects

Choose farming, hydropower or ecosystems. Write a four-step causal chain from glacier shrinkage to a possible effect. Use “may” or “can” where appropriate.



STUDENT WORKSHEET 2

The valley water council

Your team advises a fictional valley. In a dry summer, its usable water supply falls from 100 to 70 units per week. Demand remains 100 units. A minimum flow for the river ecosystem is already reserved and must not be reduced. These are invented classroom data, not a forecast for a real place.

3 Find the problem

Calculate the weekly shortfall and percentage fall in supply. Name two groups or activities affected. Do these figures prove that glacier loss caused the whole reduction?

4 Choose a fair action package

You have 8 budget tokens. Choose measures costing no more than 8 and saving at least 30 water units per week. For this exercise, savings are independent and can be added; real projects would need to check this.

Measure	Cost	Saving	Trade-off or limitation
A Repair leaking pipes	5	20 units	Works cause disruption; skilled staff are needed.
B Improve irrigation	4	15 units	Farmers need equipment and training.
C Restrict non-essential use	2	10 units	Gardens and some businesses face restrictions.
D Information campaign	1	5 units	Savings depend on voluntary participation.

Roles: water officer checks numbers; community representative checks fairness; ecosystem adviser checks environmental consequences.

Our measures _____ **Total cost** _____ **Total saving** _____

Plan a 45-second pitch: We recommend ... because One trade-off is We will protect ... by We will measure ... after implementation.

Add one mitigation action with a named actor. Explain why the water-saving package is mainly adaptation.



TEACHER ANSWERS AND SOURCES

Solutions and assessment

Reading tasks

1 Faster melting can initially increase runoff. Continued net ice loss reduces stored ice; after peak water, the smaller glacier can provide less runoff. Timing differs between regions. Not every river depends mainly on glaciers.

2 Example: glacier shrinkage → less seasonal meltwater after peak water → less irrigation water → possible crop losses. Accept hydropower or ecosystem chains with a plausible mechanism. Rainfall, demand and management can change the outcome.

Council task

3 Shortfall: $100 - 70 = 30$ units per week. Supply falls by 30%. The data do not isolate the cause: rainfall or infrastructure may also affect supply. The case illustrates water stress, not a measured attribution study.

4 Feasible packages: A + C costs 7 and saves 30; A + C + D costs 8 and saves 35; B + C + D costs 7 and saves 30. No other listed combination meets both constraints. There is no single best answer: students must justify effects on users, fairness and feasibility. Projected savings need verification in practice.

Example pitch: "We recommend repairing leaks and limiting non-essential use. This costs seven tokens and could close the 30-unit gap. We would protect essential household needs and the reserved river flow. Some businesses would face restrictions, so the council should consult them. The water officer should compare weekly demand before and after the measures."

Water management responds to impacts and is mainly adaptation. A mitigation example is a school reducing fossil-fuel heating emissions. Do not assume every water-saving measure automatically produces a quantified emissions reduction.

Quick assessment

Award 0-2 points for each: causal explanation; correct calculations and feasible package; justified trade-off and clear adaptation/mitigation distinction. Total: 6. Use the written explanations and council pitches to assess understanding. Note one misconception to address next lesson.

Sources and reuse

[1] UNESCO. UN World Water Development Report 2025: Mountains and Glaciers, Water Towers.
<https://www.unesco.org/en/reports/wwdr/2025>

[2] WMO. Glacier melt will unleash avalanche of cascading impacts (2025).
<https://wmo.int/news/media-centre/glacier-melt-will-unleash-avalanche-of-cascading-impacts>

Last visited: 13 October 2026.