
Learning for an arid future

Climate education designed for the MENA
context

Imported climate materials teach other people's rivers. This paper sets out the climate the region actually has, the six themes that belong in its classrooms, and a competency map for teaching them with local data.

The argument in one page

Most climate education available in Arabic was written somewhere else. The glaciers are Alpine, the floods are European, the seasons are the wrong way round. Translation carries the words across and strands everything a lesson actually runs on: the examples, the datasets, the equipment, the belonging.

This matters more here than almost anywhere. The Middle East and North Africa is warming at close to twice the global average rate,¹ holds some of the lowest renewable water per person on record,² and is projected, on high-emission paths, to approach heat thresholds that limit outdoor life.³ The region's students will manage the sharpest version of the problem. Their lessons describe someone else's.

The answer is not more translation. It is authorship: climate lessons built on the region's own measured data, in Arabic first, coded to real curriculum units, teachable inside a 40-minute period. Paper 01 in this series defines the standard such lessons must meet.

This paper maps what to author: six themes, three competency stages each, and an honest register of what exists against the map today. One cell is live. Seventeen are open. That is not a weakness of the map. It is the work, named.

FIGURE 1 • THE IMPORTED LESSON, UNPACKED



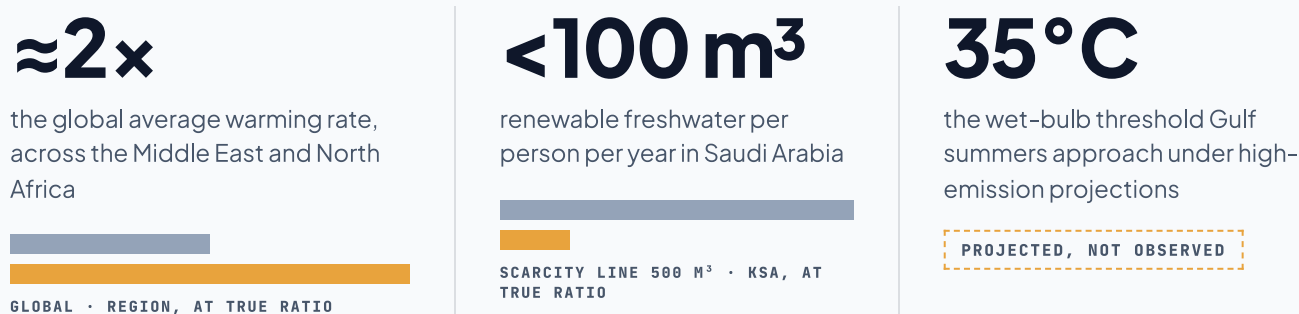
1 ZITTIS ET AL. 2022, REVIEWS OF GEOPHYSICS • **2** FAO AQUASTAT • **3** PAL & ELTAHIR 2016, NATURE CLIMATE CHANGE

01 The climate the region actually has

Three numbers define the teaching context. The region is warming at close to twice the global average rate, which makes every generic warming curve an understatement here.¹ Renewable freshwater in Saudi Arabia runs below 100 cubic metres per person per year, less than a fifth of the UN absolute-scarcity line, which makes water arithmetic a life skill rather than a chapter.² And on high-emission paths, parts of the Gulf approach wet-bulb temperatures near the limit of safe outdoor activity, which makes heat design a civic subject.³

None of these numbers appears in a lesson built on Alpine snowmelt. A curriculum that imports its climate education imports a milder climate along with it, and students notice the difference between what the worksheet says and what the afternoon feels like. Credibility is a resource too, and translation spends it.

FIGURE 2 • THREE NUMBERS THE SHELF IGNORES



SOURCES: ZITTIS ET AL. 2022 • FAO AQUASTAT • PAL & ELTAHIR 2016 • PROJECTIONS LABELLED AS PROJECTIONS

1 ZITTIS ET AL. 2022 • 2 FAO AQUASTAT • 3 PAL & ELTAHIR 2016

02 Six themes, one design rule

The themes are not imported either. They are the region's own operating problems: water security, extreme heat, food systems, the energy transition, biodiversity, and resilient cities. Each one is already a national programme somewhere in the region. Each one can be a lesson.

The design rule is the same for all six: local data, a local example, and a 40-minute lesson a teacher can prepare tonight. If a theme cannot yet meet the rule, the honest response is a dashed cell in the register, not a translated worksheet.



Water security

aquifers, desalination,
harvesting what the air holds



Extreme heat

wet-bulb limits, shade as
infrastructure, the school day
itself



Food systems

what grows here, what water it
costs, what the plate imports



Energy transition

the grid mix, why noon matters,
the roof as a power plant



Biodiversity

native species, what survives
here and why it matters



Resilient cities

why old streets were narrow,
designing for the heat to come

The six themes are deliberately civic. Every one ends in something a student can measure or redesign within walking distance of the classroom, because applied projects are where climate learning stops being vocabulary.

The MENA climate–learning map

Every cell is a lesson to build. Solid means live in the resource bank. Dashed means open.

THEME	KNOW • NAME THE SYSTEM	MEASURE • LOCAL EVIDENCE	DESIGN • A RESPONSE	STATUS
 Water security	the water the region drinks: aquifers, desalination, fog	measure water captured per spray cycle, Aseer field data	propose a capture plan for the school site	LIVE • SCI-4-2.1
 Extreme heat	explain wet-bulb heat and why shade is infrastructure	log surface temperatures across the school site	design a cooler walking route to school	OPEN
 Food systems	trace one local crop from farm to plate	measure the water cost of one school-meal ingredient	propose one substitution and write out its trade-off	OPEN
 Energy transition	explain the grid mix and why noon matters	measure panel yield at three roof angles	plan the school's own solar day	OPEN
 Biodiversity	name five native species and the roles they play	survey one square metre of schoolyard life	design a native planting plan for one bed	OPEN
 Resilient cities	explain why the old streets were narrow	map shade and wind on the school block	redesign one street corner for the heat to come	OPEN

03 The build order

Start where measured local data already exists. The live cell exists because fog-harvesting data from the Aseer highlands existed first: real collectors, real millilitres, a real place students can name. The lesson followed the dataset, not the other way round. That is the build order for every open cell on the map.

This is also the invitation. Environmental institutions hold survey data. Municipalities hold heat and shade maps. Utilities hold the grid mix. Youth programmes hold field time. Each dataset shared is a lesson unlocked, and each lesson meets the standard of Paper 01 before it ships: coded, Arabic-first, teachable tomorrow morning.

What we ask of educators is smaller and harder: refuse the translated worksheet. A dashed cell honestly named is worth more than a foreign lesson fluently delivered, because the dashed cell tells the system what to fund.

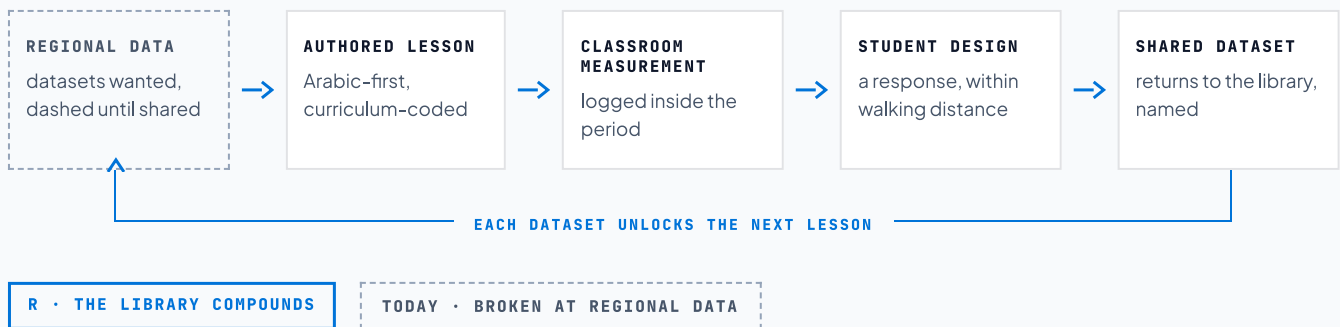
DATASETS THAT UNLOCK LESSONS • DASHED MEANS WANTED

HEAT AND SHADE MAPS	GRID MIX BY HOUR	SPECIES SURVEYS	WATER COST PER CROP	FIELD TIME
FOG CAPTURE • HELD				

A lesson built on someone else's river teaches that climate is someone else's subject.

The data loop behind every authored lesson

Local data becomes a lesson; the lesson produces new local data. Authorship closes the loop translation cannot.



THE SYSTEM IN NUMBERS

12 of 17

of the world's most extremely
water-stressed countries are in
MENA

WRI AQUEDUCT WATER RISK ATLAS 2019

80%

of available water already drawn
each year in those most-stressed
countries

WRI AQUEDUCT 2019

≈2x

the global average warming rate
across the region

ZITTIS ET AL. 2022, REVIEWS OF
GEOPHYSICS

About this series

The Last Mile Papers are published by The Green Box (GBOX), a sustainability capability-building organisation founded at Cambridge Judge Business School in 2018, working across 16 countries with delivery hubs in Cambridge, Riyadh, Al Khobar, and Lahore. The series argues one idea from six directions: education priorities only create impact when teachers have practical resources, contextual capability, and measurable outcomes. Paper 03 maps climate learning for arid realities; the readiness standard its lessons are built to is published in Paper 01.

GREENBOX.WORLD/NTRP



Sources

- 01 Zittis, G., et al. (2022). Climate Change and Weather Extremes in the Eastern Mediterranean and Middle East. Reviews of Geophysics.
- 02 Pal, J. S., Eltahir, E. A. B. (2016). Future temperature in southwest Asia projected to exceed a threshold for human adaptability. Nature Climate Change.
- 03 FAO. AQUASTAT: renewable water resources per capita, Saudi Arabia.
- 04 Kingdom of Saudi Arabia (2026). Voluntary National Review, p.154.
- 05 GBOX (2026). NTRP resource-bank register and Aseer fog-harvesting field data.
- 06 The Green Box (2026). The Last Mile Papers 01: The last mile of education innovation.
- 07 World Resources Institute (2019). Aqueduct Water Risk Atlas: country water-stress rankings.

Positions, stated and revisable

The Last Mile Papers are opinion pieces. They present the positions The Green Box holds at the date on the cover, formed from the sources named in each paper and argued so they can be checked.

Positions can change. Where new evidence, corrected data, or a better argument arrives, the position moves and a revised edition says so. Later editions supersede earlier ones; the edition date on the cover is the record.

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An arid future is a teachable subject.

Six themes, local data, one lesson at a time.

NEXT IN THE SERIES • 04 • FROM NATIONAL PRIORITIES TO CLASSROOM PRACTICE

