# HAZARDS ASSESSMENT

## Vulnerability Evaluation of Schools to Natural and Conflict-Related Factors

2 March 2024

وحدة تنسيق الدعم
ASSISTANCE COORDIANTION UNIT

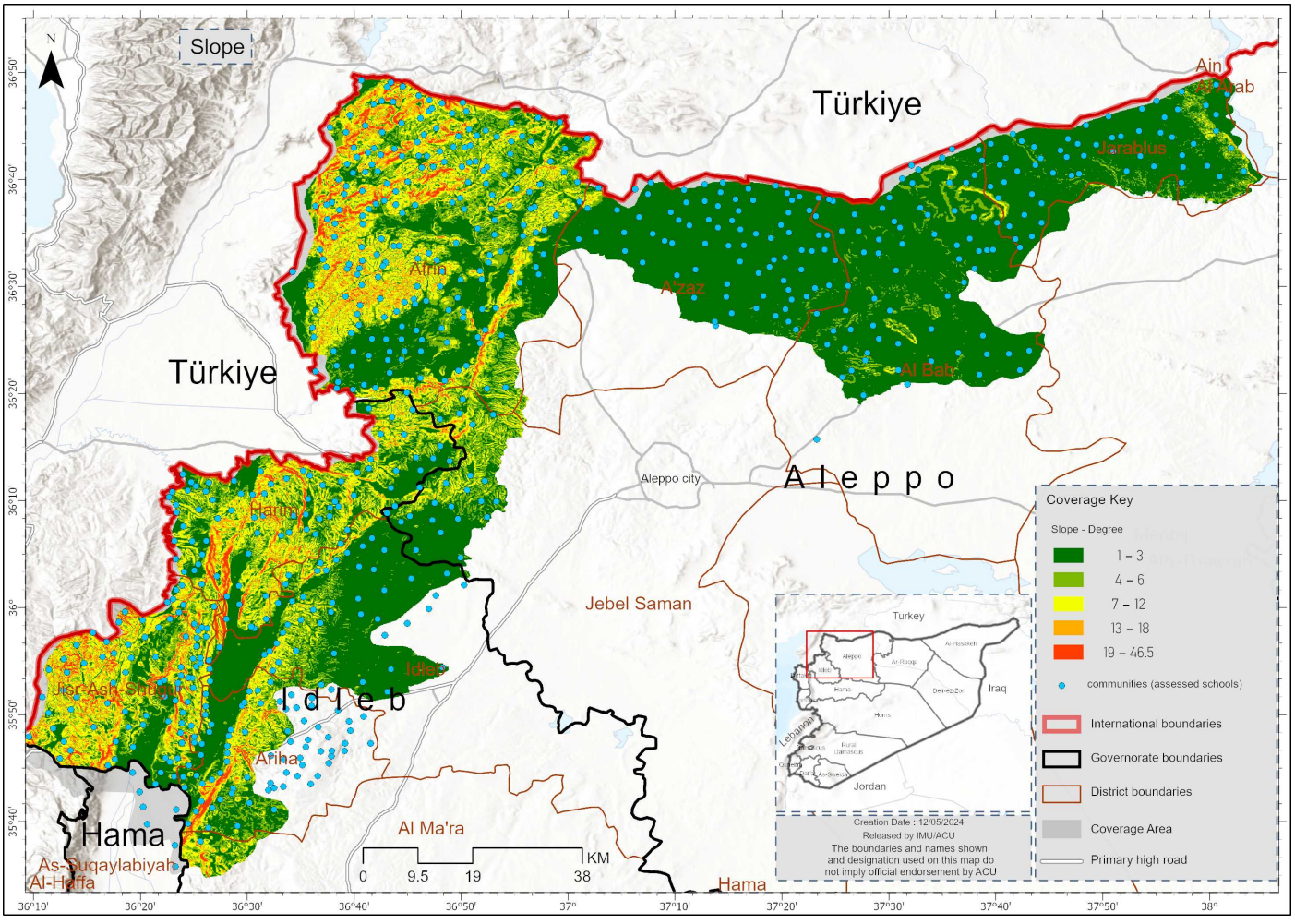
قطاع التعليم
استجابة سوريا
عبر الحدود
Education Cluster
Syria
Cross Border

# HAZARDS ASSESSMENT

## Vulnerability Evaluation of Schools to Natural and Conflict-Related Factors

### 1. Terrain Evaluation: Analyzing the Impact of Land Slope on School Grounds

| Slope range in degrees | Number of schools |
|---|---|
| **1- 3** | 1,270 |
| **4- 6** | 407 |
| **7- 12** | 303 |
| **13- 18** | 15 |
| **19- 46.5** | 1 |
| **0** | 615 |
| **Grand Total** | **2,611** |



The slope of land surrounding a school can impact the school environment, infrastructure, and safety. Here's how different degrees of inclination can affect schools:

**1-3 Degrees:** This range of incline is observed in various regions including the northern areas of Aleppo, encompassing sub-districts such as Al Bab, Ar-Ra'ee, A'zaz, Aghtrin, Mare', Suran, and Jarablus, as well as the southern region of Afrin district, particularly South of Jandairis sub-district. Additionally, this degree of slope characterizes parts of the eastern Idleb governorate, notably the sub-districts of Teftnaz, Bennsh, Sarmin, and Saraqab.

- Minimal impact: At this slight slope, there may be negligible effects on schools unless there are specific infrastructure or landscape design vulnerabilities.
- Drainage: Proper drainage planning may still be necessary to prevent water accumulation during heavy rainfall.

**4-6 Degrees:** This degree of slope characterizes the terrain to the northeast of Afrin district and in the western parts of Aleppo.

- Accessibility: Steeper slopes might require additional infrastructure, such as ramps or stairs, to ensure accessibility for all students, staff, and visitors.
- Erosion control: Measures to prevent erosion and soil degradation may become more critical at this slope.

**7-12 Degrees:** This degree of slope is commonly found in several areas including Afrin district, as well as in the northern and western regions of Idleb governorate**.**

- Safety concerns: Steeper slopes can pose safety hazards, particularly during inclement weather or emergencies such as fires or earthquakes. Evacuation procedures may need to be adjusted accordingly.
- Stability: The stability of structures built on slopes becomes more critical, requiring appropriate engineering and construction standards.

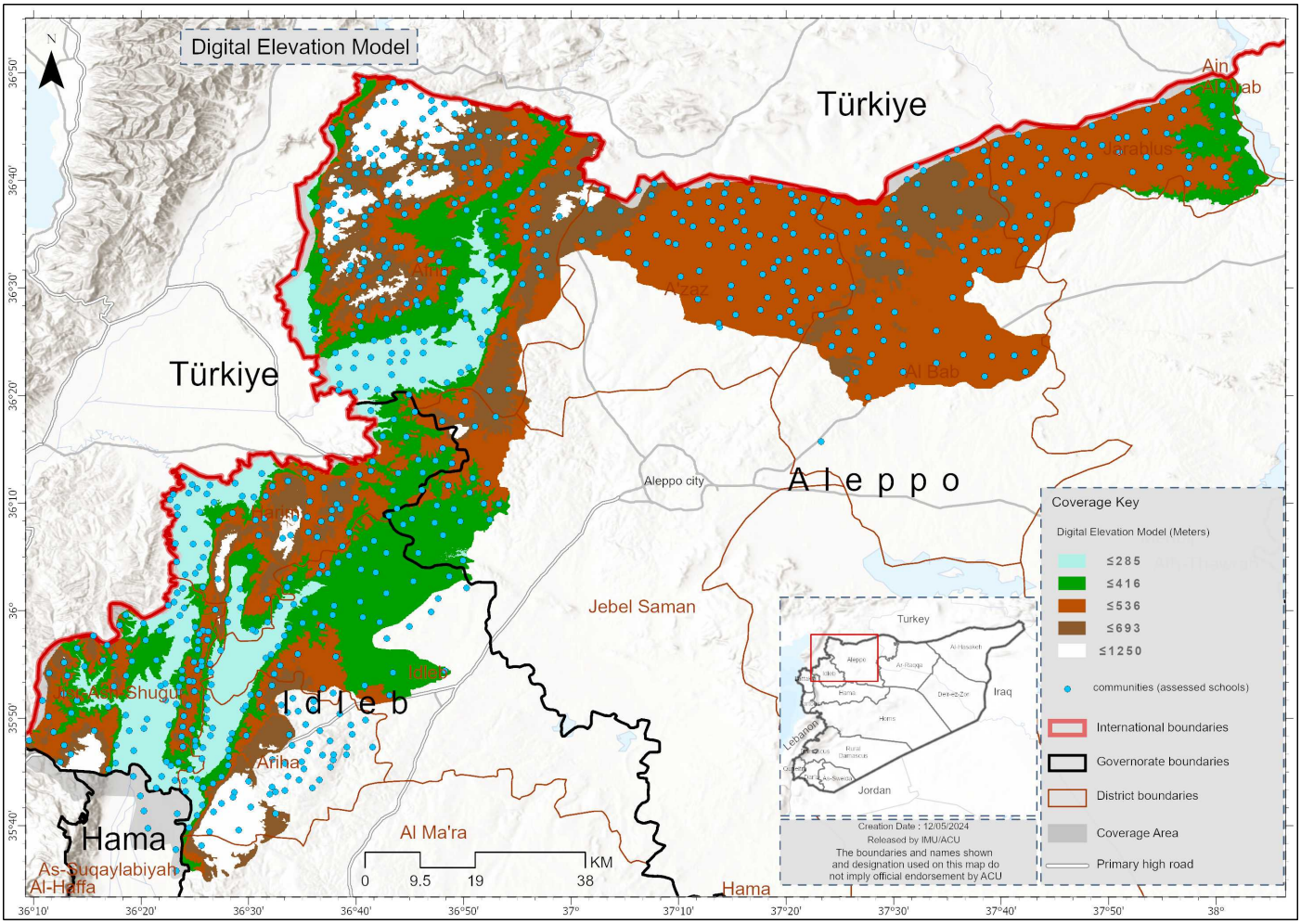
**19-46 Degrees:**

- Severe risks: Schools situated on such steep slopes face significant challenges related to safety, stability, and accessibility.
- Landslide hazards: The risk of landslides increases substantially, necessitating extensive geological assessments and mitigation measures.
- Cost implications: Building on such steep terrain can significantly increase construction and maintenance costs due to the need for specialized engineering solutions.

In summary, the slope of the land surrounding a school can affect its accessibility, safety, infrastructure requirements, and maintenance costs. Schools on steeper slopes face more significant challenges and require careful planning and investment to ensure a safe and conducive learning environment.

## 2. Elevation Zones, Terrain Overview

| Elevation Zones range by meters | Number of schools |
|---|---|
| **694-1,250** | 152 |
| **537-693** | 316 |
| **417-536** | 865 |
| **286-416** | 802 |
| **<=285** | 476 |
| **Grand Total** | **2,611** |




The impacts of digital elevations of land above sea level on school buildings vary depending on the elevation range:

**694-1,250 meters:**

- Increased risk of exposure to extreme weather conditions such as heavy snowfall, high winds, and potential avalanches in mountainous regions.
- Structural designs must account for snow loads, wind loads, and seismic activity to ensure the safety and resilience of school buildings.

**537-693 meters:**

- Moderate elevation range with fewer extreme weather risks compared to higher elevations.
- Schools may still need to consider drainage, soil stability, and wind exposure, but the overall risk level is lower than at higher elevations.

**417-536 meters:**

- Schools in this range may face some soil stability and drainage challenges, but they are generally less susceptible to extreme weather events than higher elevations.
- Proper site grading and drainage infrastructure are essential to mitigate potential water runoff and soil erosion issues.

**286-416 meters:**

- Moderate to low elevation range with reduced exposure to extreme weather conditions.
- Schools may still need to implement measures to address drainage and soil stability concerns, but the overall risk level is lower than at higher elevations.

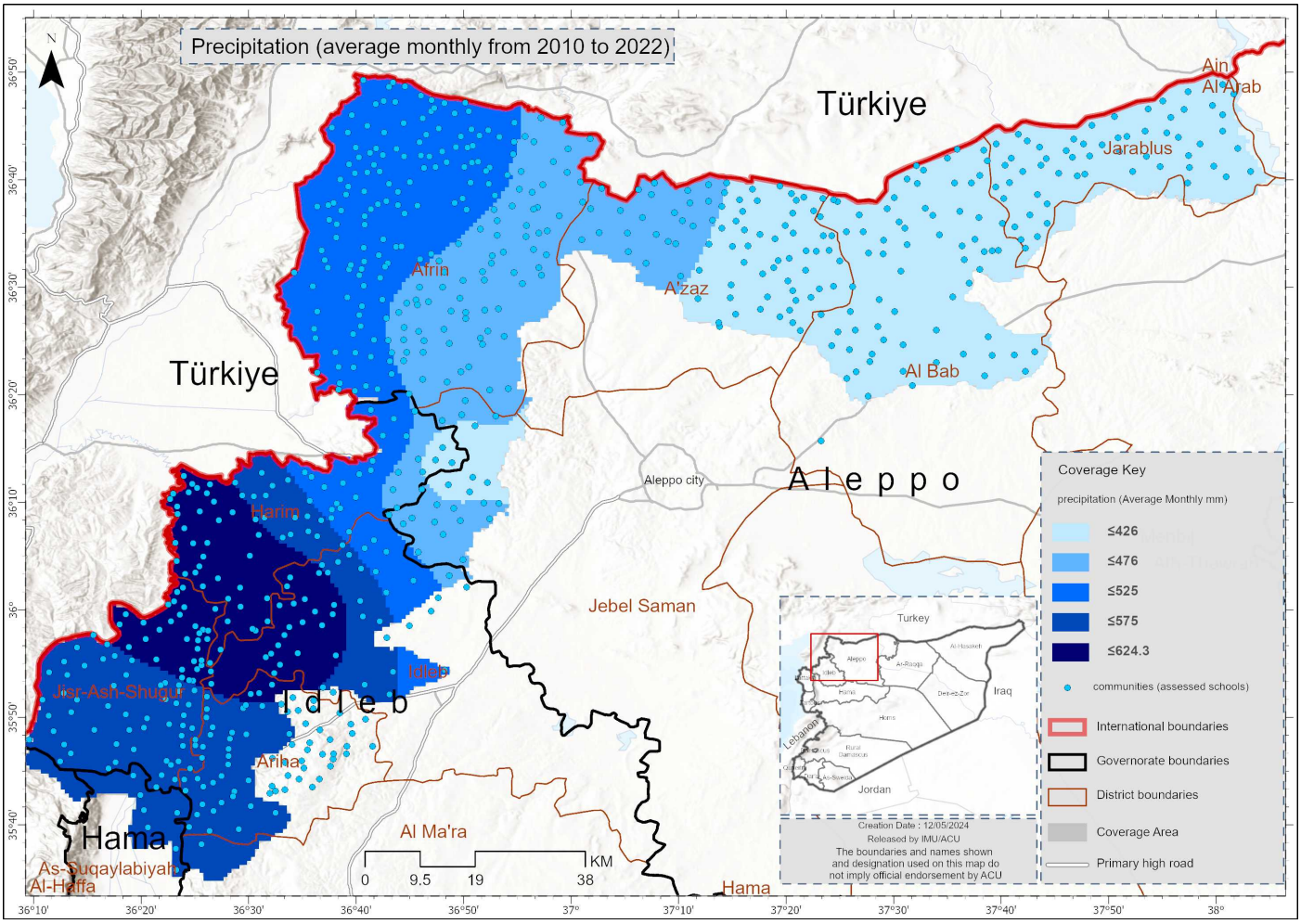
**<=285 meters:**

- Low-lying areas near sea level may face increased vulnerability to flooding, especially during heavy rainfall or storms.
- Schools in these areas must implement flood mitigation measures such as elevated foundations, flood barriers, and proper drainage systems to protect against water damage and ensure the safety of students and staff.

In summary, the digital elevation of land above sea level directly impacts the vulnerability of school buildings to various natural hazards, including extreme weather events, soil instability, and flooding. Schools must consider these factors when planning, designing, and constructing their buildings to ensure safety and resilience against potential risks.

## 3. Assessing the Impact of Rainfall on Schools

| Precipitation range- millimeters | Number of schools |
|---|---|
| **0** | 188 |
| 1-426 | 558 |
| 427-525 | 544 |
| 526 -575 | 445 |
| 576 -625 | 406 |
| 626 -476 | 470 |
| **Grand Total** | **2,611** |




The impact of rainfall on school buildings and the educational system can vary based on the average rainfall levels in different areas:

**<=426 millimeters:**

- Limited disruption: Schools in regions with lower average rainfall may experience fewer disruptions to the educational system due to weather-related closures or damage to infrastructure.

- Maintenance requirements: While the impact may be less severe, schools still need regular maintenance to address drainage, erosion control, and occasional building water damage.

**<=476 millimeters:** This level of rainfall characterizes regions such as the sub-districts of A'zaz, Afrin, and Sharan, where numerous school camps are situated and are particularly vulnerable to the impacts of rainfall.

- Moderate challenges: Schools in areas with moderate average rainfall may face occasional disruptions and challenges related to water infiltration, drainage, and infrastructure maintenance.
- Educational continuity: Efforts to maintain functional drainage systems and implement preventive maintenance measures help ensure minimal disruptions to the educational system during rainy periods.

**<=575 millimeters:** This level of rainfall characterizes the sub-districts of Dana and Harim, where the most significant number of school camps are situated and are particularly vulnerable to the impacts of rainfall.

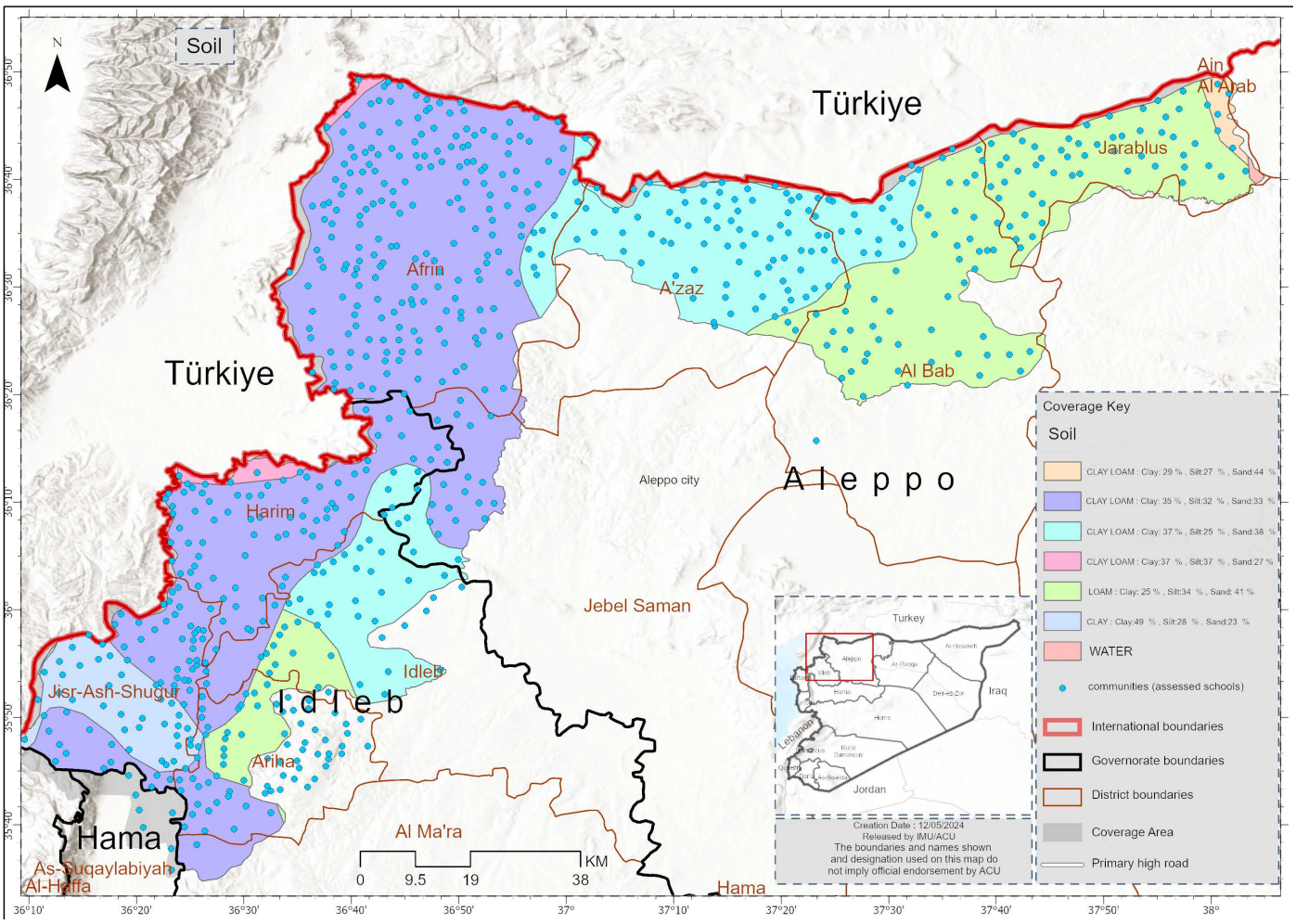
- Increased risks: Schools in regions with higher average rainfall levels may encounter more frequent and intense rainfall events, leading to heightened risks of flooding, water damage, and infrastructure disruption.
- Educational disruptions: Severe weather conditions may result in temporary closures, evacuation procedures, or damage to school buildings, impacting the continuity of education for students and staff.

**<=624 millimeters:**

- Significant challenges: Schools in areas with high average rainfall face heightened risks of flooding, landslides, and structural damage during heavy rainstorms or prolonged wet seasons.
- Infrastructure resilience: Robust infrastructure design, including proper drainage systems, flood mitigation measures, and resilient building materials, becomes crucial to minimize the impact of rainfall on school buildings and ensure the safety of students and staff.
- Educational adaptation: Schools may need to develop contingency plans, emergency response protocols, and flexible learning strategies to address disruptions caused by severe weather events and maintain educational continuity.

In summary, the impact of rainfall on school buildings and the educational system is influenced by the average rainfall levels in the region. Schools must implement appropriate infrastructure measures, maintenance practices, and academic strategies to mitigate risks and ensure their facilities' and educational operations' safety and resilience.

## 4. Analyzing Soil Types and Their Impact on schools




### a. Clay Loam (1st Sample)

Clay: 28%, Silt: 43%, Sand: 29%

Features: With a lower clay content and higher silt content, this soil type still offers decent water retention and drainage. However, occasional road closures during heavy rains due to waterlogging can hinder students' school access.

Effect on School Buildings: Low. The soil's characteristics pose minimal risk to school buildings.

Effect on Students: Moderate. Occasional road closures may disrupt students' commute to school during heavy rains.

Access to Schools: Moderate. Occasional road closures could hinder students' access to schools.

Severity: Moderate. While the impact on school buildings is low, occasional road closures affect students' access to education.

**b. Clay Loam (2nd Sample)**

Clay: 35%, Silt: 32%, Sand: 33%

Features: Slightly higher clay content may lead to better water retention but poorer drainage. It poses moderate risks to school buildings. Occasional road closures during heavy rains could affect students' access to schools.

Effect on School Buildings: Moderate. The soil's drainage capacity poses moderate risks to school buildings.

Effect on Students: Moderate. Occasional road closures may disrupt students' commutes during heavy rains.

Access to Schools: Moderate. Occasional road closures could hinder students' access to schools.

Severity: Moderate. Risks to school buildings and access to schools are both moderate.

**c. Clay Loam (3rd Sample)**

Clay: 37%, Silt: 25%, Sand: 38%

Features: Higher clay content with moderate drainage poses moderate risks to school buildings. Occasional road closures during heavy rains may impact students' access to schools. Effective drainage systems can mitigate issues.

Effect on School Buildings: Moderate to High. The higher clay content increases the risk of moisture infiltration, potentially causing structural damage.

Effect on Students: Moderate. Occasional road closures may disrupt students' commutes during heavy rains.

Access to Schools: Moderate. Occasional road closures could hinder students' access to schools.

Severity: Moderate to High. Risks to school buildings are moderate to high, with moderate effects on students and access to schools.

**d. Clay Loam (4th Sample)**

Clay: 37%, Silt: 37%, Sand: 27%

Features: Balanced clay and silt with potential drainage issues pose moderate risks to school buildings. Occasional road closures during heavy rains may affect students' access to schools. Effective drainage solutions are essential.

Effect on School Buildings: Moderate to High. Drainage issues may lead to moisture-related damage.

Effect on Students: Moderate. Occasional road closures may disrupt students' commutes during heavy rains.

Access to Schools: Moderate. Occasional road closures could hinder students' access to schools.

Severity: Moderate to High. Risks to school buildings and access to schools are both moderate to high.

**e. Loam**

Clay: 25%, Silt: 34%, Sand: 41%

Features: Balanced mixture providing good fertility, drainage, and water retention. It poses moderate risks to school buildings. Occasional road closures during heavy rains could impact students' access to schools.

Effect on School Buildings: Moderate. Occasional water infiltration may pose some risks.

Effect on Students: Moderate. Occasional road closures may disrupt students' commutes during heavy rains.

Access to Schools: Moderate. Occasional road closures could hinder students' access to schools.

Severity: Moderate. Risks to school buildings and access to schools are both moderate.

### f. Clay

Clay: 49%, Silt: 28%, Sand: 23%

Features: High clay content leading to poor drainage poses significant risks to school buildings. Frequent road closures during heavy rains severely affect students' access to schools, requiring specialized infrastructure and proactive measures.

Effect on School Buildings: High. Poor drainage increases the risk of structural damage.

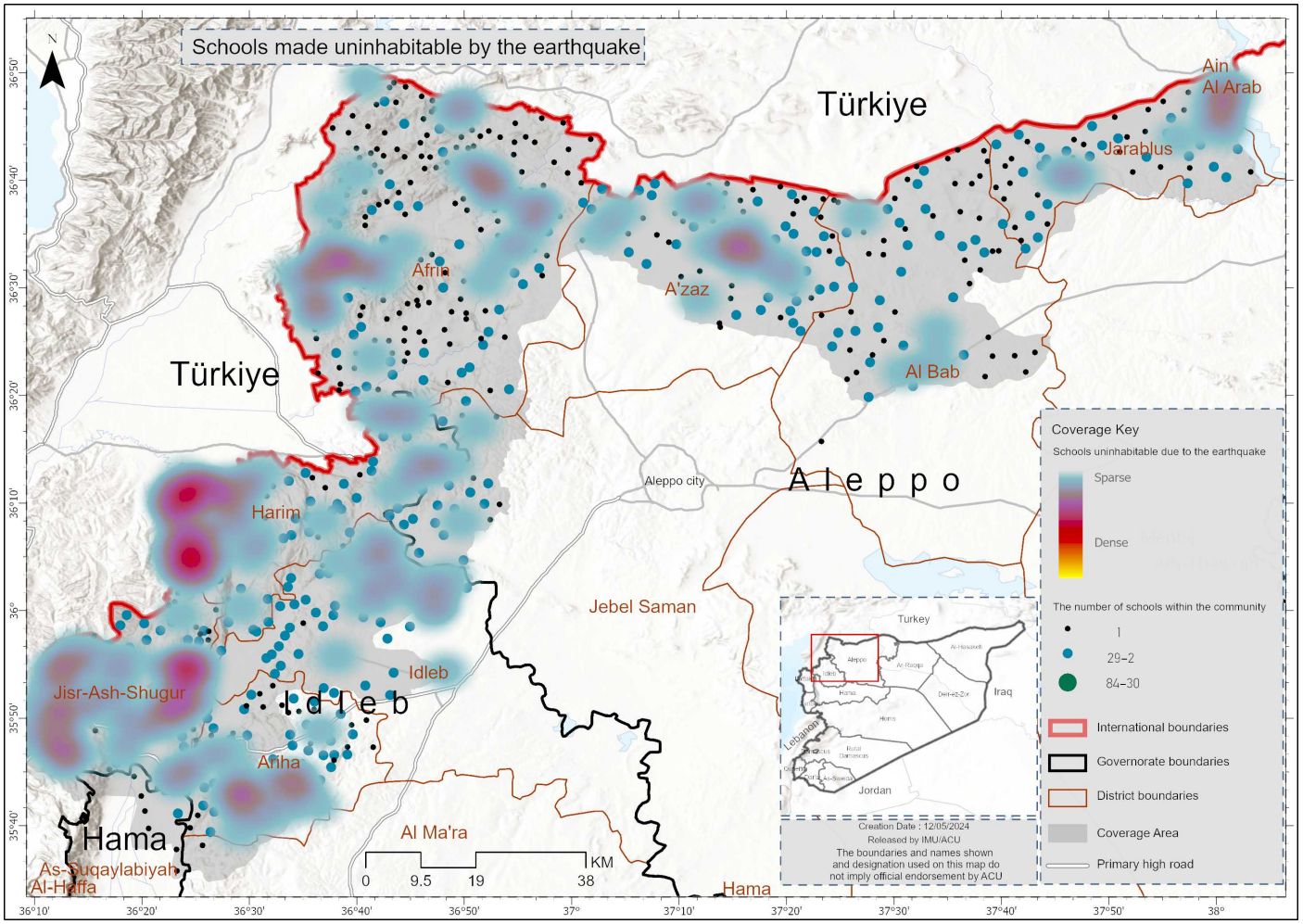
Effect on Students: High. Frequent road closures severely disrupt students' commute.

Access to Schools: High. Frequent road closures significantly hinder students' access to schools.

Severity: High. Risks to school buildings, students, and school access are all high. Specialized measures are necessary.

## 5. Earthquake Vulnerability: Assessing Risks and Mitigation Strategies

| Earthquake risk | Number of schools |
|---|---|
| **Minor risk** | 1,303 |
| **Medium risk** | 6 |
| **High risk** | 243 |
| **Grand Total** | **1,552** |

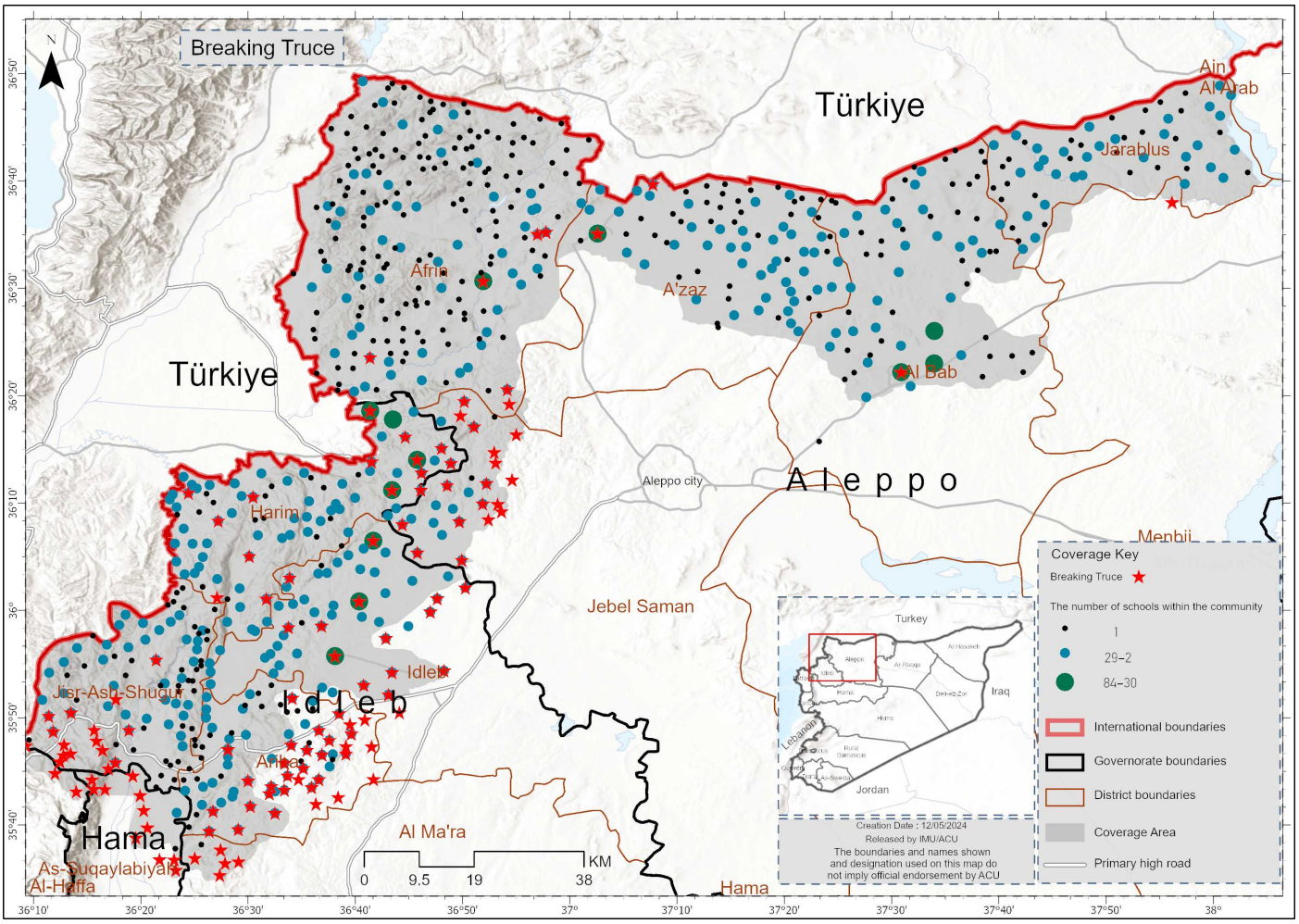



On February 6, 2023, at dawn, a strong earthquake hit southern Turkey and northern Syria with a magnitude of 7.8 on the Richter scale, resulting in thousands of casualties and thousands of injured in Turkey and North-West Syria. Through its field team network, the Assistance Coordination Unit (ACU) conducted a needs and damage assessment following the devastating earthquake. The number of casualties in North-West Syria was 4,540, and the number of injured was 8,786. The number of completely destroyed buildings was 1,869, and the number of partially destroyed buildings was 8,731. More than 79 humanitarian workers lost their lives as a result of the devastating earthquake, most of them working for humanitarian NGOs. 148 cities and towns in northwestern Syria have been affected, including seven heavily affected cities, as the population of the heavily affected cities is 374,514. Aftershocks are continuing and are 1,552 schools located in the affected areas; of 243 schools under high risk of the earthquake and the aftershocks, 6 schools are under medium risk, and 1,303 are under minor risk.

## 6. Assessing the Impact of Military Operations on schools

In Northwest Syria, the relentless military operations have led to daily tragedies, claiming the lives of both students and their teachers. These casualties stem from a range of sources, from the deliberate targeting of schools during shelling to the heart-wrenching occurrences of students and teachers being harmed while journeying to their educational institutions. Furthermore, the presence of unexploded ordnance near schools or along their paths adds a layer of peril. These harrowing circumstances underscore the immense challenges confronting educational establishments and the communities they serve amid conflict.

During the past year alone, a staggering 93 communities witnessed military operations and war-related incidents, a sad reality that directly and indirectly impacted 946 schools in the region.




# HAZARDS ASSESSMENT

## Vulnerability Evaluation of Schools to Natural and Conflict-Related Factors

2 March 2024

وحدة تنسيق الدعم
ASSISTANCE COORDIANTION UNIT

قطاع التعليم
استجابة سوريا
عبر الحدود
Education Cluster
Syria
Cross Border