

GIS for Community Engagement and Anticipatory Action



AKDN

AGA KHAN DEVELOPMENT NETWORK



AGA KHAN FOUNDATION



FOCUS HUMANITARIAN ASSISTANCE PAKISTAN

The Aga Khan Development Network

The Aga Khan Development Network (AKDN), is a group of agencies that have been working to improve living conditions and opportunities for low-income communities in developing countries for over 60 years in over 30 countries around the world. It currently operates around 1,000 programmes and institutions.



Culture

The AKDN integrates cultural development into many of its projects. The various city parks and gardens it has built provide tens of millions of urban dwellers with oases of green space.



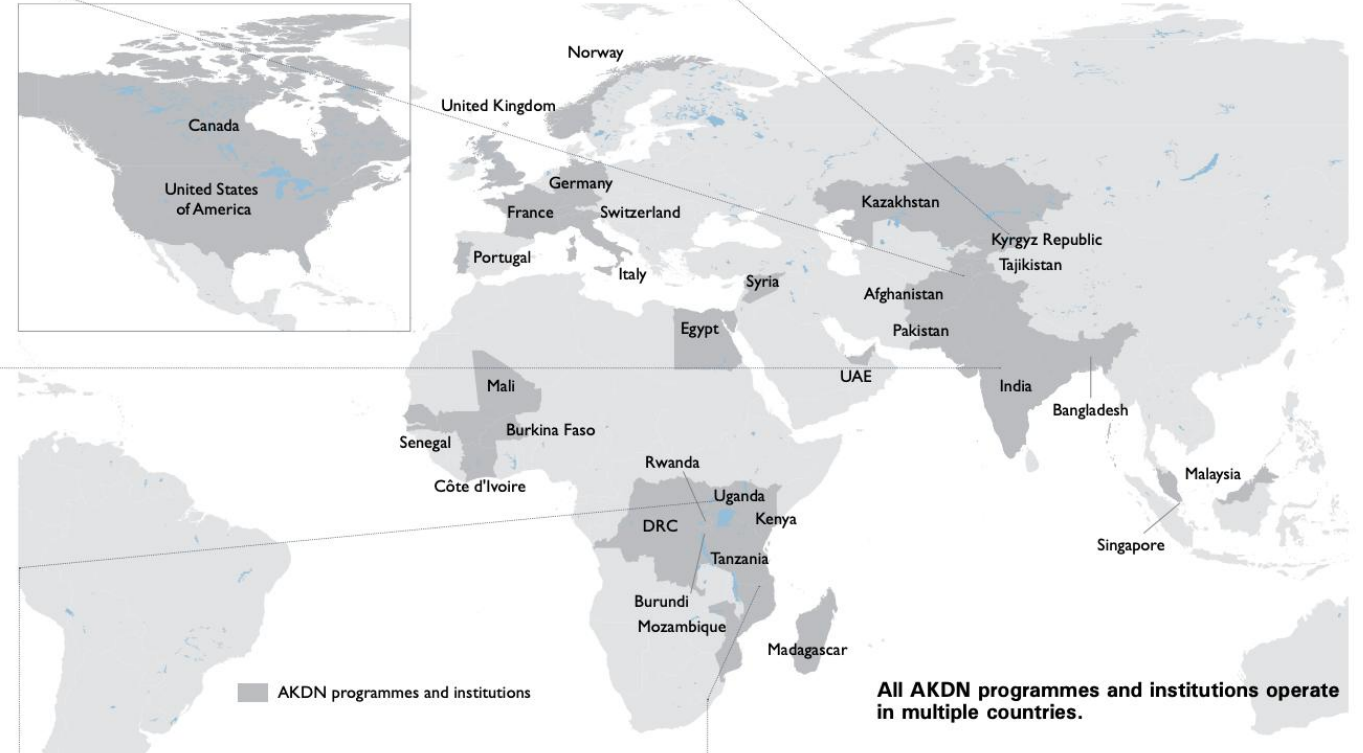
Health Care

The AKDN operates one of the largest non-profit, private healthcare systems in the developing world. Because effective healthcare depends on qualified staff, the **training of healthcare workers** is of central importance.



Education

The AKDN operates educational programmes that range from pre-school to post-graduate studies. The **University of Central Asia** is under construction in Naryn, Kyrgyzstan, and due to open its Bachelor-Master degree programmes in 2016.



All AKDN programmes and institutions operate in multiple countries.



Infrastructure

The AKDN promotes entrepreneurial activity in the developing world by investing in **large power generation projects**, industrial production, tourism development and financial services, among other areas.



Rural Development

In 11 poor and remote areas of the developing world, the AKDN **rural support programmes help 8 million people** to achieve greater food security, raise household incomes and improve the overall quality of life.

Each year in collaboration with its partners, AKDN:



5 million

Receives 5 million visitors in its various parks and gardens



2 million

Reaches 2 million students pre-school to university level



5 million

Provides quality health care to 5 million people



10 million

Generates electricity for 10 million people

Risk Identification



- AKAH has identified **3000+ target settlements** across Afghanistan, Pakistan, Tajikistan, India and Syria and has conducted Hazard Vulnerability Risk Assessments (HVRAs) in 2,497. This covers a population of nearly 3 million people and the HVRAs are updated every three years.



- Monitors **15+ large glacial lakes** in the region using drones, helicopter missions, and Bathymetric assessment and modeling.



Preparedness & Response:

- Village Disaster Management Plans (VDMP): **1,780 villages have a VDMPs**. To develop an HVRA and VDMP requires a dedicated team of AKAH staff including geologists, engineers and social mobilisers. We also provides awareness and first responder training sessions to the community to build their capacity to implement their plans during a disaster.



- First Responder network and advanced response teams: a network of **38,896 active first responder, Search & Rescue, Disaster Assessment Response, and Avalanche Preparedness volunteers**; 38% of whom are women. AKAH regularly trains and equips these volunteers to be ready to response to an emergency in their communities.



- Stockpiles: **2,241 villages with access to stockpiles** within 12 hrs. Stockpiles provide quick access to non-food relief supplies and are constantly replenished and checked for quality in order to maintain readiness.



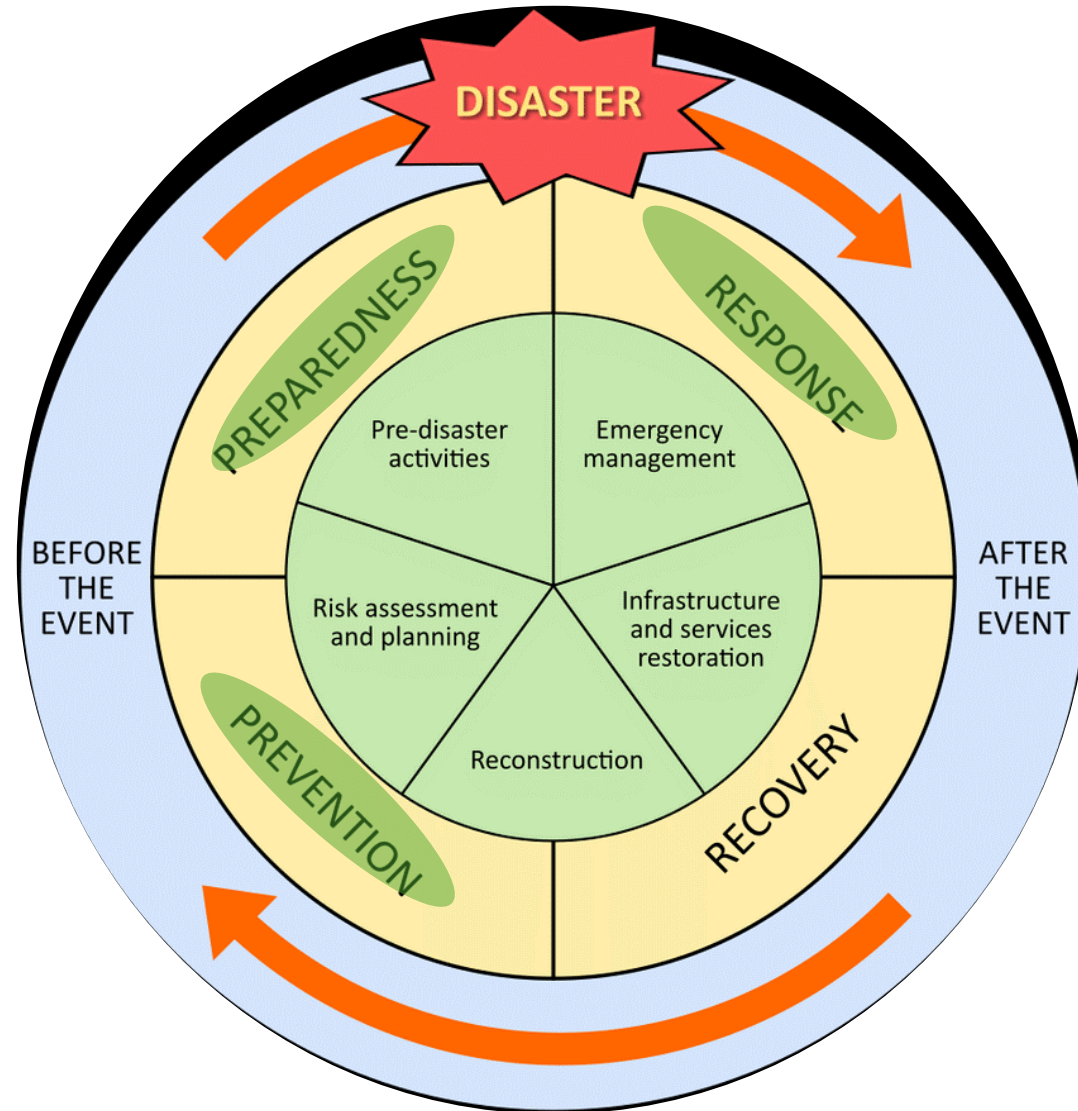
- Fail-safe Communications: **2,047 villages have fail-safe communications** (2 or more modes of communication)



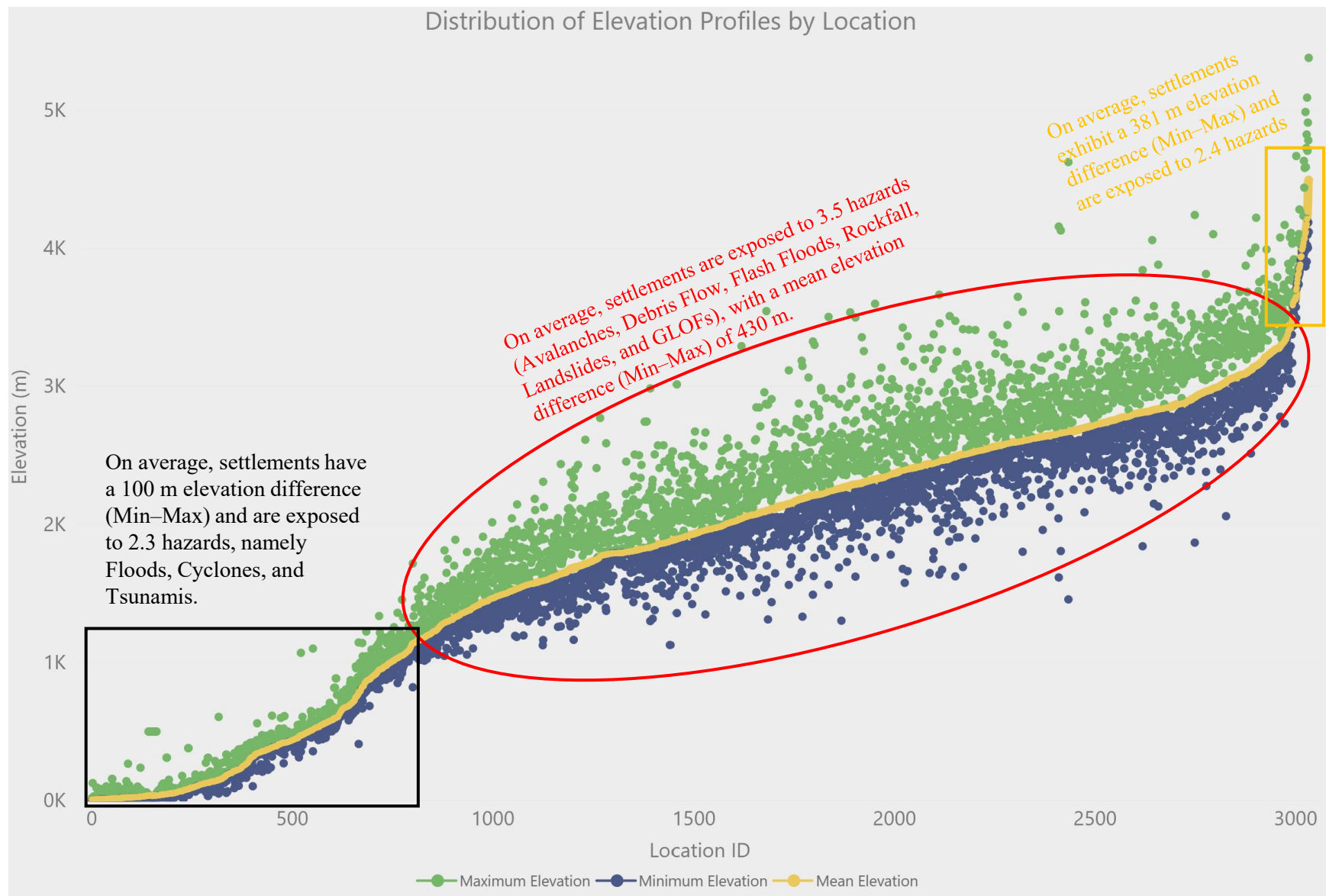
- Early Warning processes and systems: We maintains a network of **88 weather monitoring posts (WMPs)** covering avalanche-prone villages across Afghanistan, Pakistan and Tajikistan



Disaster Management

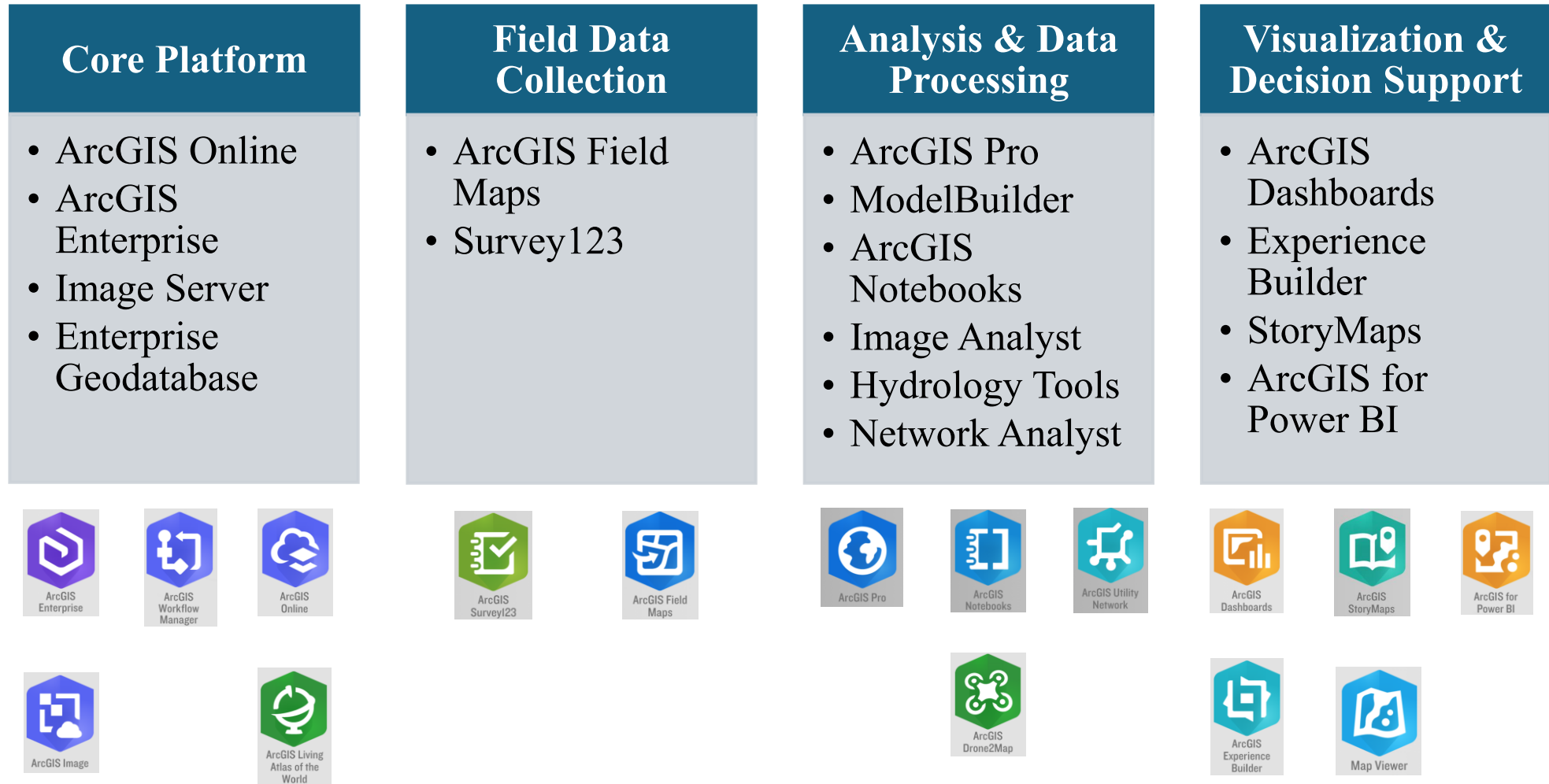


We work at different altitude and geography



- Afghanistan, India, Pakistan, Syria and Tajikistan
- 3000+ Settlements
- Coastal, plain, and mountainous regions
- Altitudes ranging from 0 to 4,500m

ArcGIS Ecosystem Enabling Data-Driven DRR Interventions



GIS for Anticipatory Action

Hazard, Vulnerability and Risk Assessment



GIS



Interventions

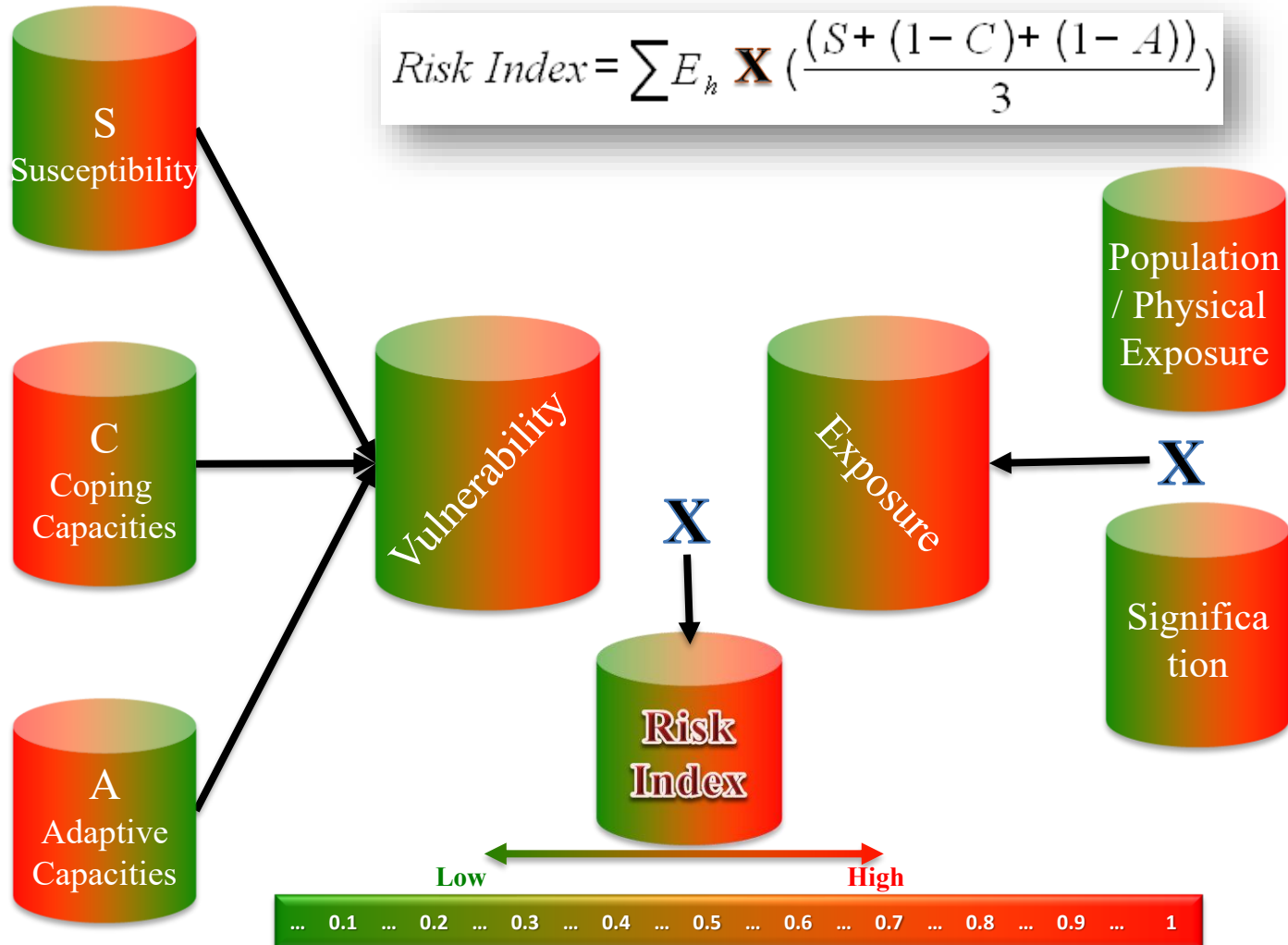


DRR

Assess Risks → Act Strategically → Reduce Disaster Risk

From knowing risks → to acting smart → which lead to building resilience

HVRA Standardized Methodology

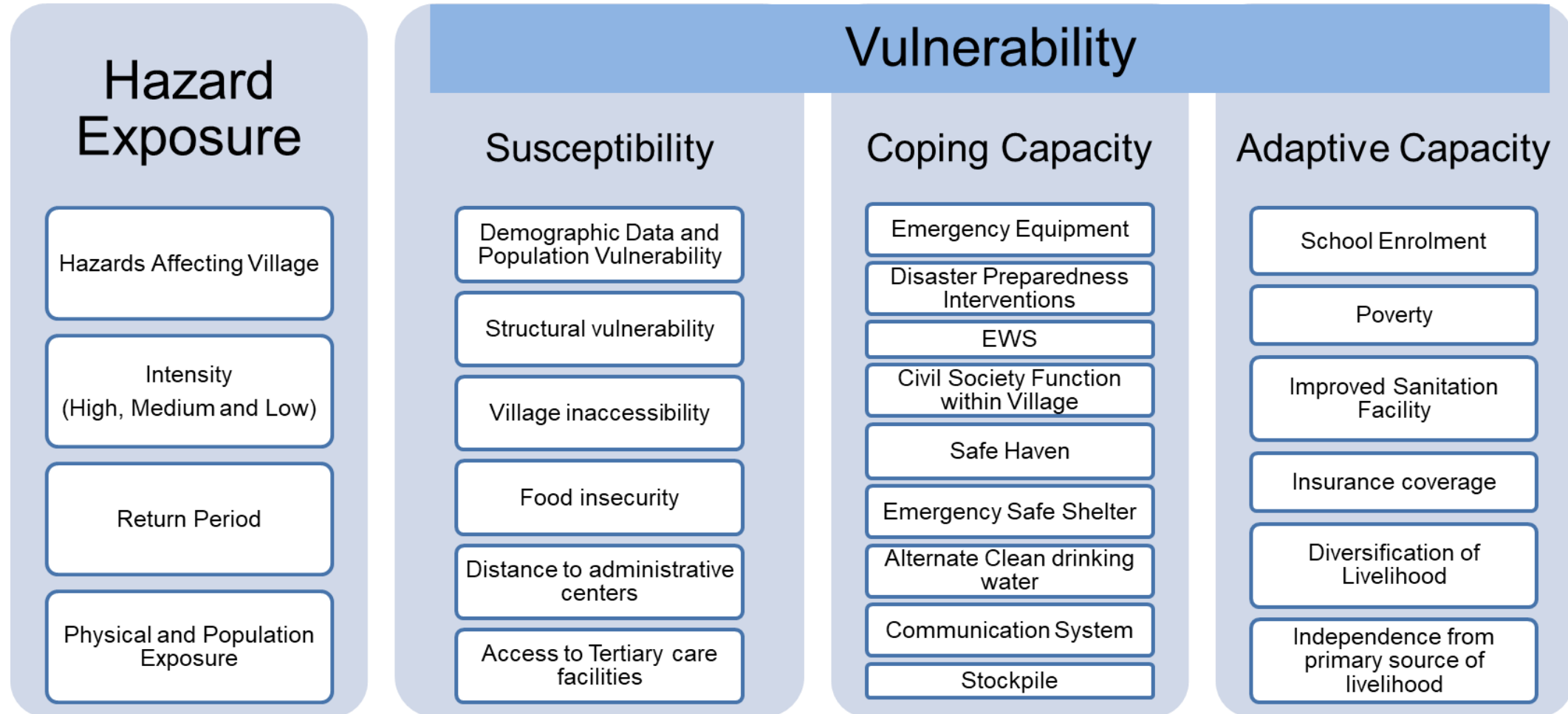


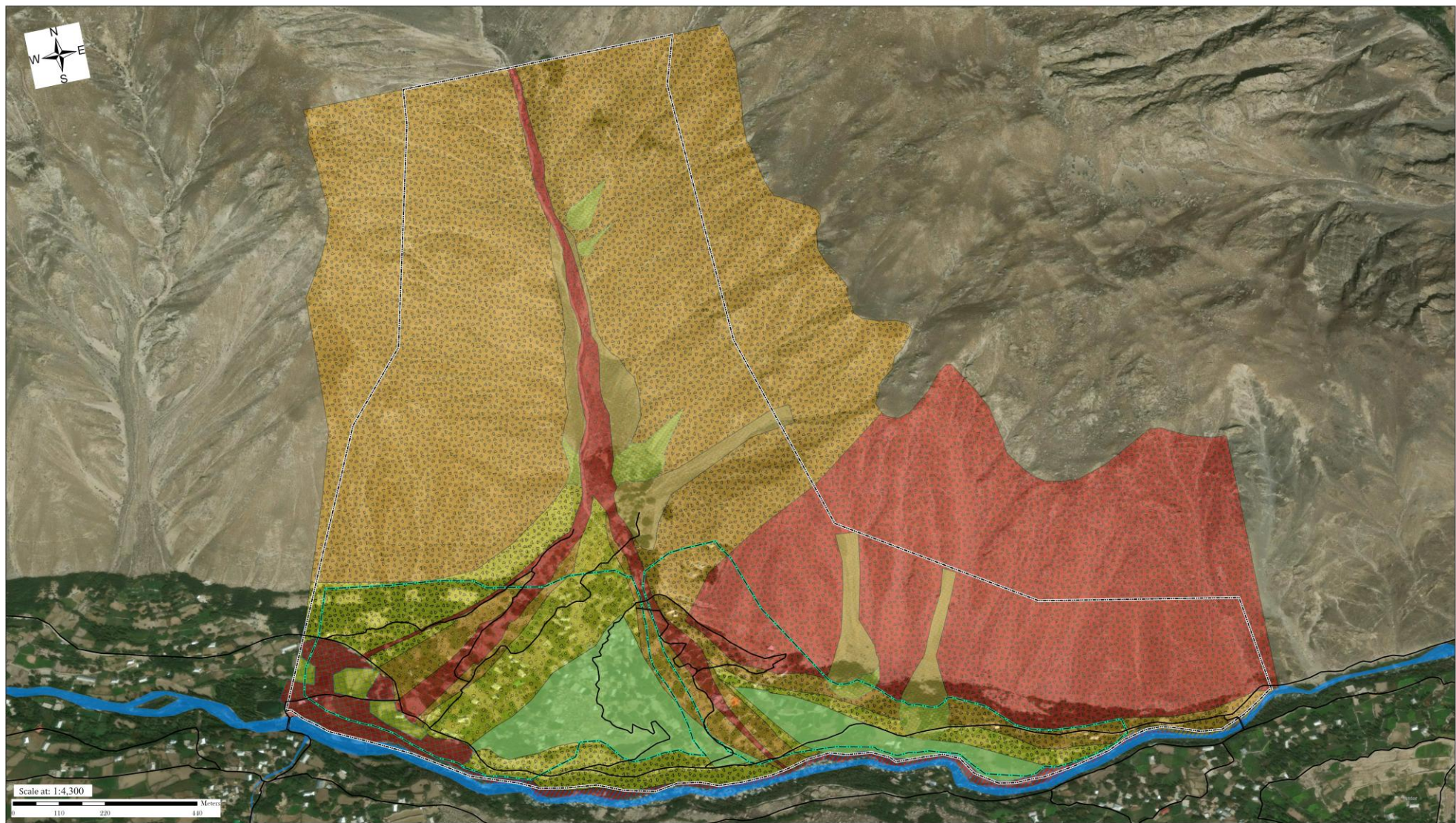
Exposure

- ☐ Extent of Impact Areas (landmass)
- ☐ Significance
 - Intensity
 - Return period
- ☐ # of people lives in hazard
- ☐ % of area exposed to hazard

Hazard Return Period	< 10 years	0.6	0.8	1
	10 - 30 years	0.4	0.6	0.8
	> 30 years	0.2	0.4	0.6
		Low	Medium	High
Hazard Intensity				

High level Indicators (Data Point)





HAZARD MAP

Updated Date: 26 August, 2025

Legends

- Road
- Active Riverbed
- Activity Zone
- Living Zone

Hazard Class

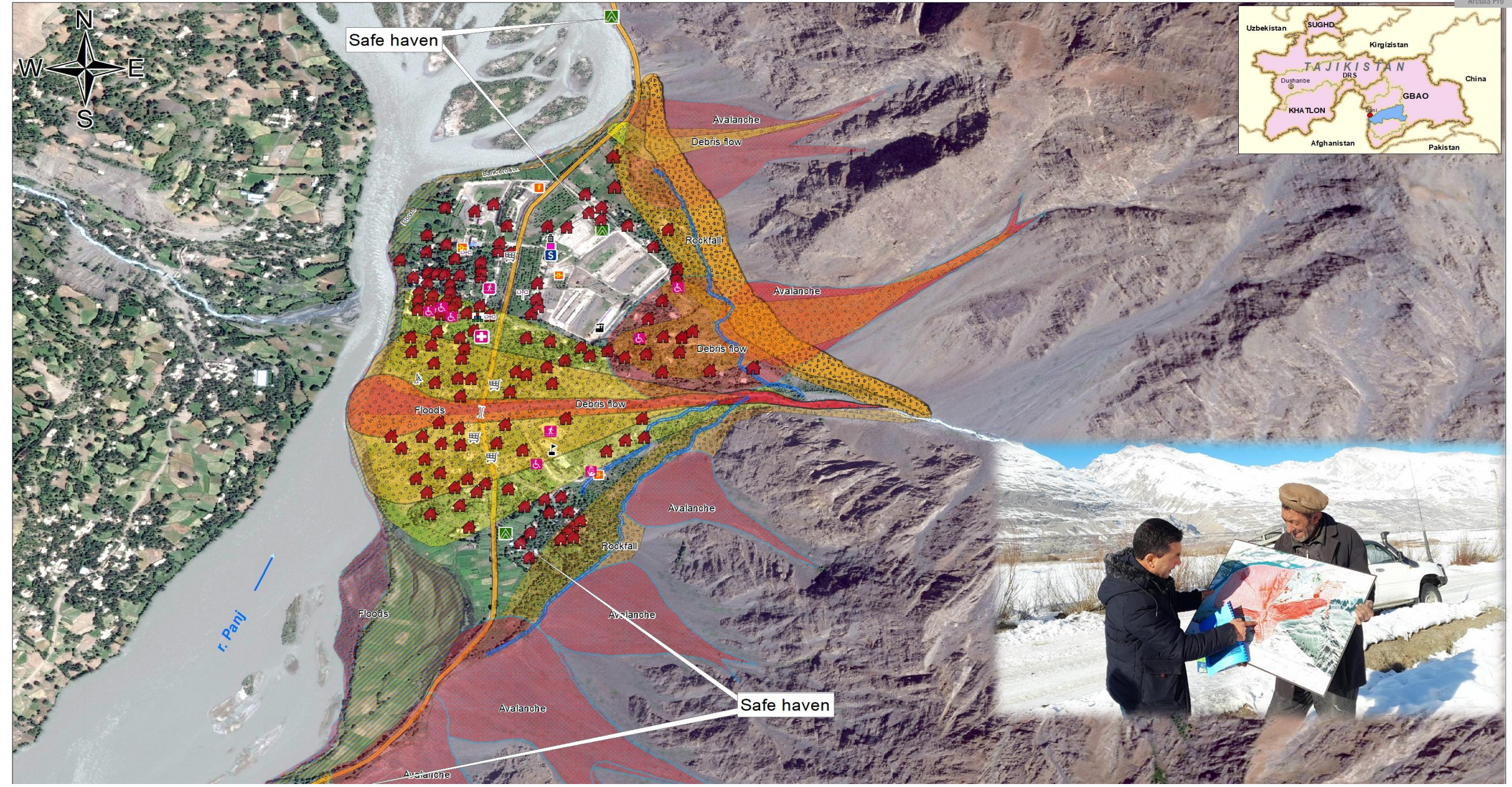
- High
- Medium
- Low
- No Known Hazard

Hazard Type

- Rock Fall
- Debris Flow
- Bank Erosion
- Underground Flood
- Flood
- Snow Avalanche

Coordinate System: GCS WGS 1984
 Datum: WGS 1984
 Data Source: Administrative Boundary, 2020 and HVRA Data Q3, 2025.
 The boundaries and names and the designations used on this map do not imply official endorsement or acceptance by the Aga Khan Development Network (AKDN). All information is the best available at the time this map was produced.

Risk informed land use planning







Application of Hazard map for Risk-Sensitive Land Use Planning

High hazard



- Construction prohibited.

Medium hazard



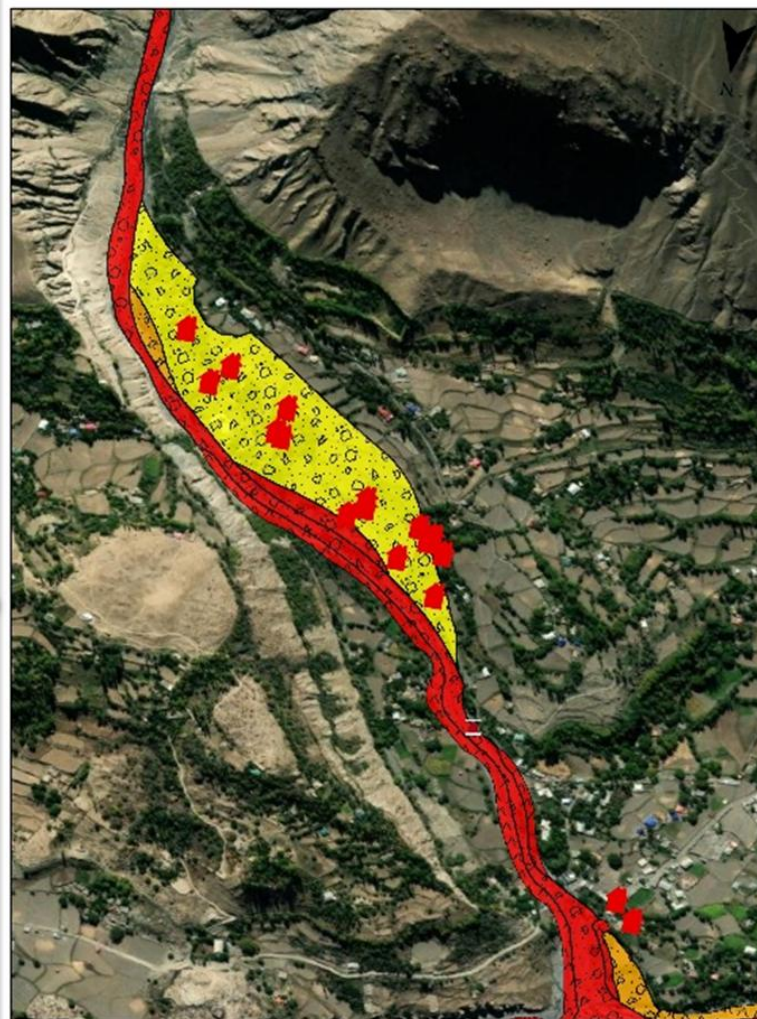
- Construction of critical infrastructures prohibited,
- Construction of non-critical infrastructures allowed but after neutralization of existing hazard in accordance with “Planning and design of risk reduction measures:
- Development should not trigger/create existing/new hazard.

Low hazard

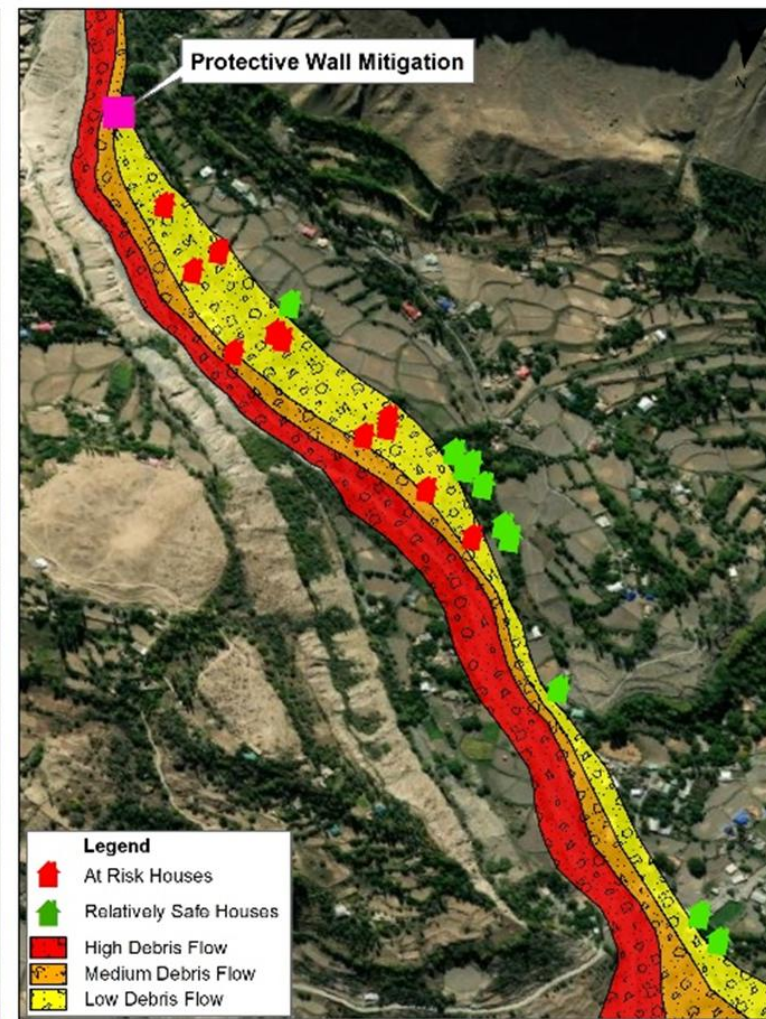


- Construction of infrastructures (including critical infrastructures) allowed but after neutralization of existing hazard
- Development should not trigger/create existing/new hazard.

Flood Protection Wall



Pre - Mitigation Hazard Situation 2017



Post - Mitigation Hazard Situation 2018



Capacity Building
of the community



Programmatic Priorities

Priority 7: Improved Technology for Emergency Preparedness/Response and Fail-Safe Emergency Communication



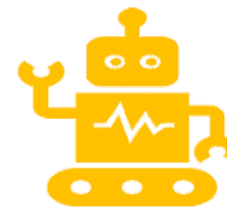
Improve hazards forecasting



In-house capacity on hazard modelling for key hazards



Site-specific EWS for dominant hazards



Adopt evolving AI and IoT



Drone/UAV for damage assessments



E-Learning Platform



Virtual reality (VR) education and simulation exercises



Improve information management system



Improve communication coverage (VSAT in Afghanistan)

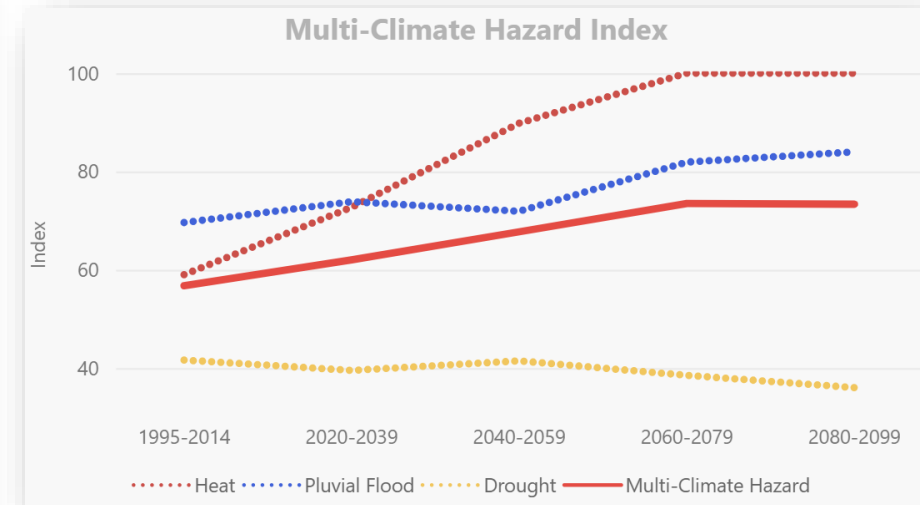


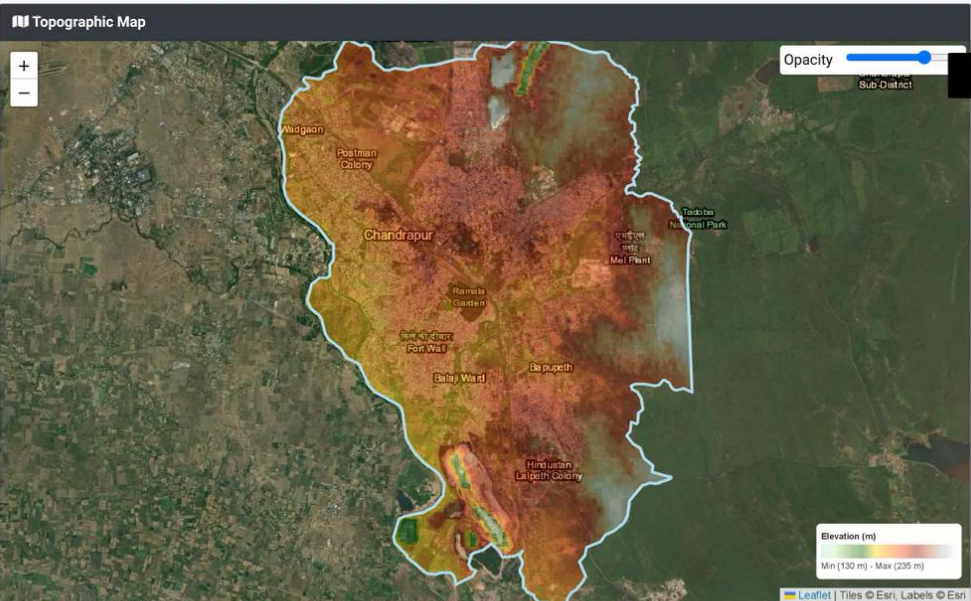
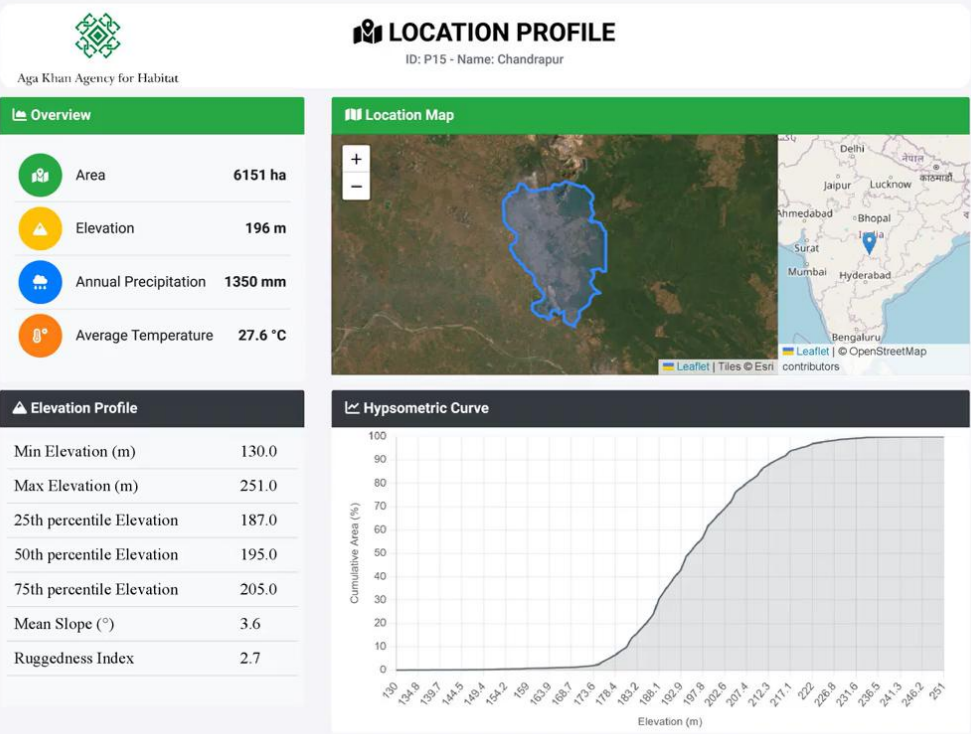
Virtual or Web-based EOC

Strengthening Assessment: A Forward-Looking Approach

🌡️ Heat Risk (Hot Days)				
Climate Variables	1995-2014	2020-2039	2040-2059	2080-2099
>30°C Days	287	300	324	357
# Tropical Nights (Tmin > 20°C)	237	249	268	325
>35°C Days	131	143	172	241
Warm Spell Duration Index	11	39	96	243
>40°C Days	35	48	64	103
🌡️ Heat Index				
Climate Variables	1995-2014	2020-2039	2040-2059	2080-2099
HI Days > 35°C	82	117	156	214
HI Days > 37°C	49	75	115	196
HI Days > 39°C	26	47	76	177
HI Days > 41°C	10	26	48	150
Excess Mortality	0.06	0.10	0.17	0.44
❄️ Cold Risk				
Climate Variables	1995-2014	2020-2039	2040-2059	2080-2099
Cold Spell Duration Index	7.7	4.0	0.5	0.0
Frost Days (Tmin < 0°C)	0.0	0.0	0.0	0.0
Ice Days (Tmax < 0°C)	0.0	0.0	0.0	0.0
⚡ Energy Demand				
Climate Variables	1995-2014	2020-2039	2040-2059	2080-2099
HDD (ref-65°F)	10	4	1	0
CDD (ref-65°F)	6,226	6,666	7,368	8,981
💨 Wind Risk				
Climate Variables	1995-2014	2020-2039	2040-2059	2080-2099
Windy Days	73.2	79.1	78.3	88.1

☁️ Consecutive Wet & Dry Days				
Climate Variables	1995-2014	2020-2039	2040-2059	2080-2099
Max # of Consecutive Dry Days	159.21	158.15	157.69	156.86
Max # of Consecutive Wet Days	24.39	28.05	28.84	32.72
☁️ Extreme Precipitation Events				
Climate Variables	1995-2014	2020-2039	2040-2059	2080-2099
Precipitation Days > 20mm	6.81	8.65	9.35	13.14
Precipitation Days > 50mm	0.96	1.66	1.74	3.12
Avg Largest 5-Days Precip	146.93	169.35	176.64	219.15
Avg Largest 1-Day Precip	58.93	67.36	70.33	85.35
Precip Intensity Index	3.67	4.05	4.17	5.20
🌱 Drought Severity (SPEI)				
Climate Variable	1995-2014	2020-2039	2040-2059	2080-2099
SPEI Index	0.12	0.54	0.62	0.93
🌱 Growing Season Length				
Climate Variables	1995-2014	2020-2039	2040-2059	2080-2099
Growing Season Length	365	365	365	365
Growing Season Length End	364	364	364	364
Growing Season Length Start	0	0	0	0
👥 Population Growth under Climate & Socioeconomic Scenarios				
Baseline 2010				
2020	5.29M			
2030	5.83M (110%)			
2040	6.37M (120%)			
2050	6.93M (131%)			
2050	7.46M (141%)			



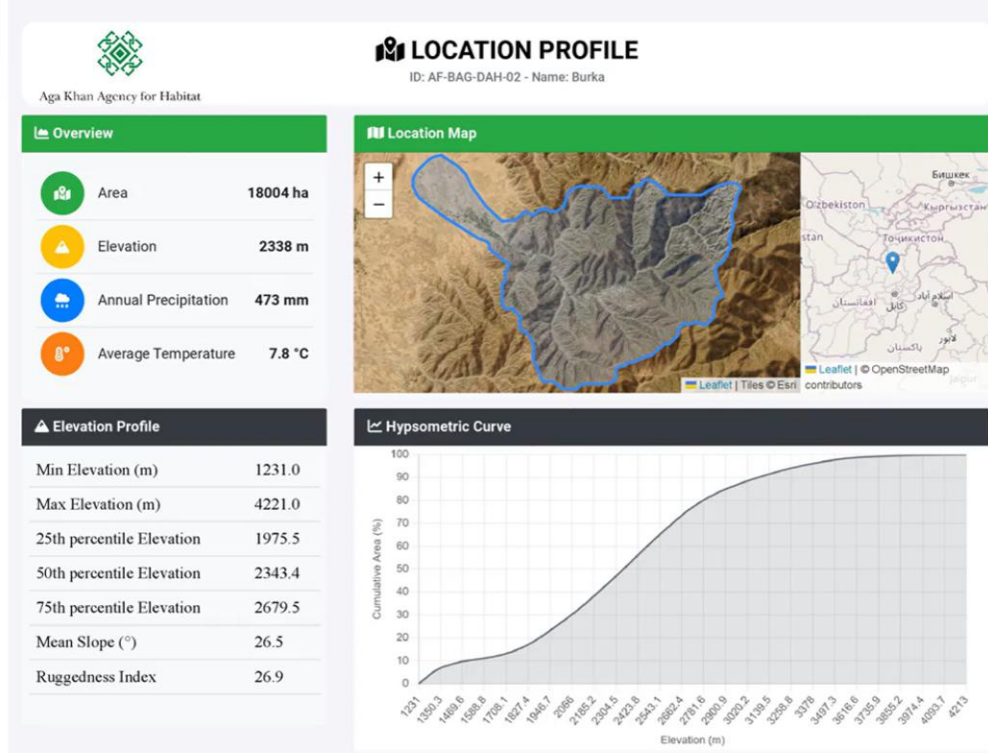


Automation

Click → Code

From Click-Based GIS to Code-Driven GIS

Automation workflow
Using ArcGIS Model Builder,
Image Analys, ArcGIS
Notebook, ArcGIS Maps API
and HTML/Web Technology



Thank You

