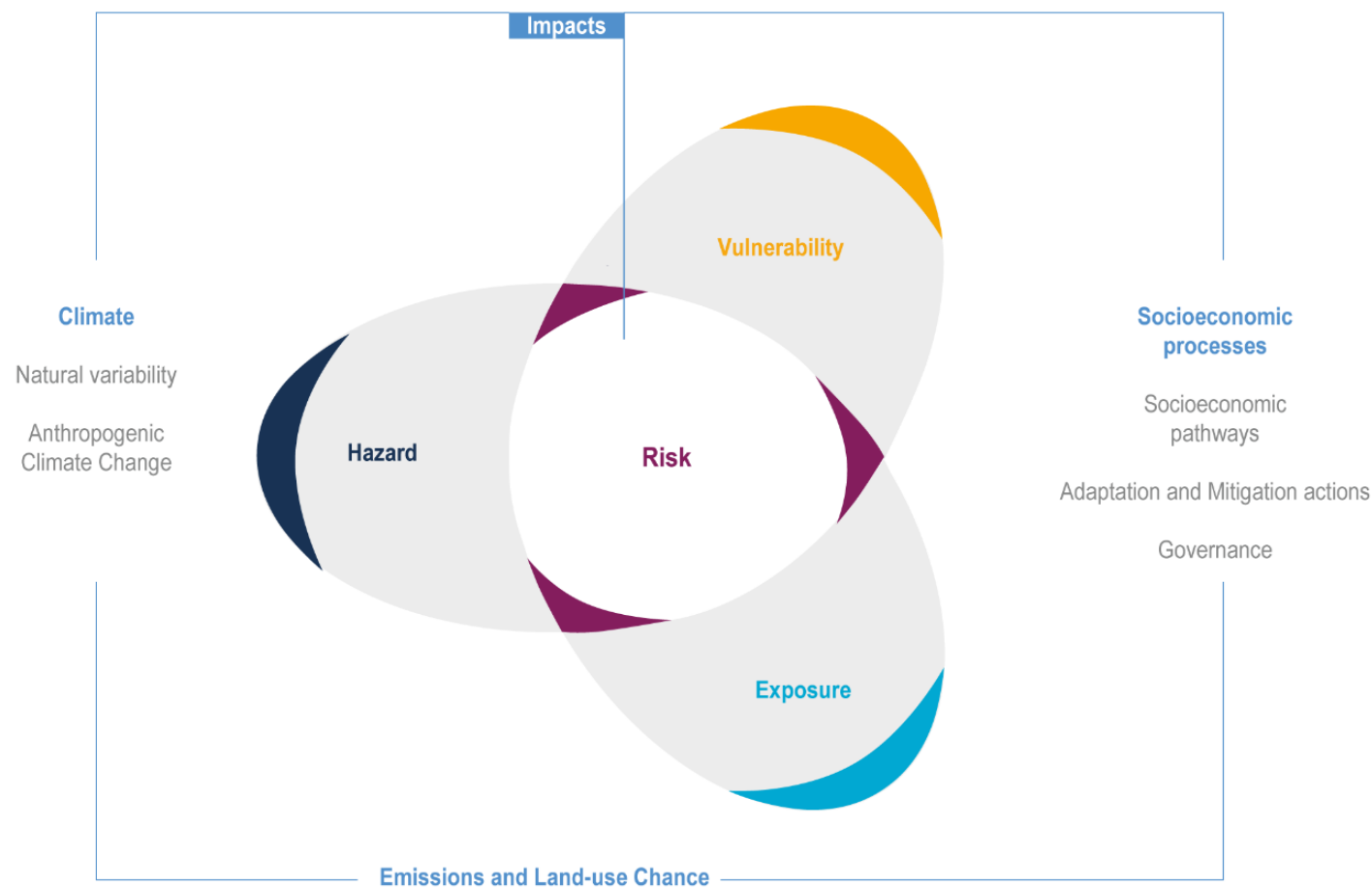


Climate Resilience and Disaster Risks Reduction in Ma'an Governorate



Climate Risk Assessment

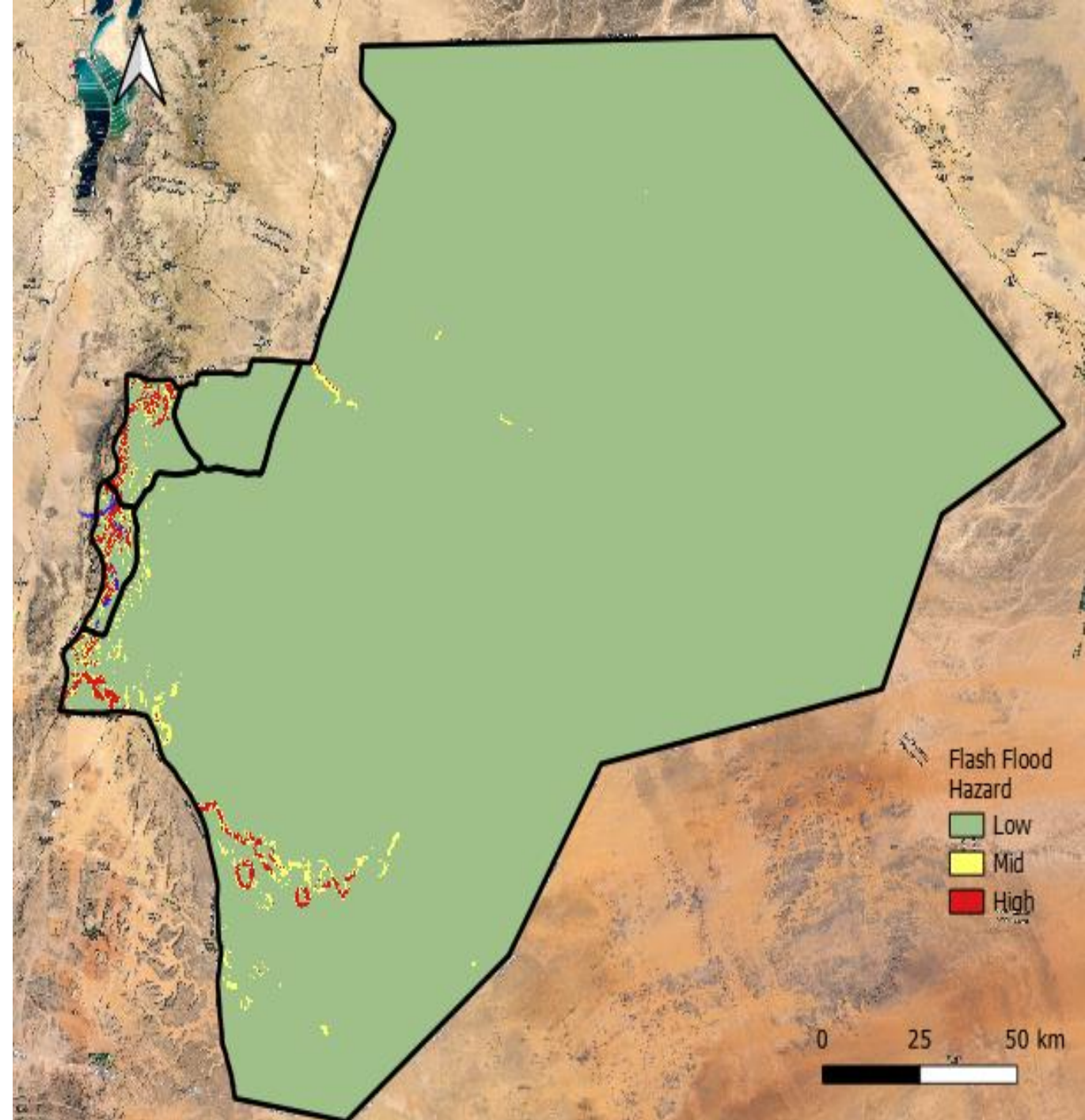
-
- Landslides
 - Droughts
 - Dust-storms
 - Flash-floods
-
- Risk = Hazard x Exposure x Vulnerability.
 - Vulnerability is assessed via sensitivity and adaptive capacity.



IPCC Climate Risk Assessment Framework

Flash-Floods

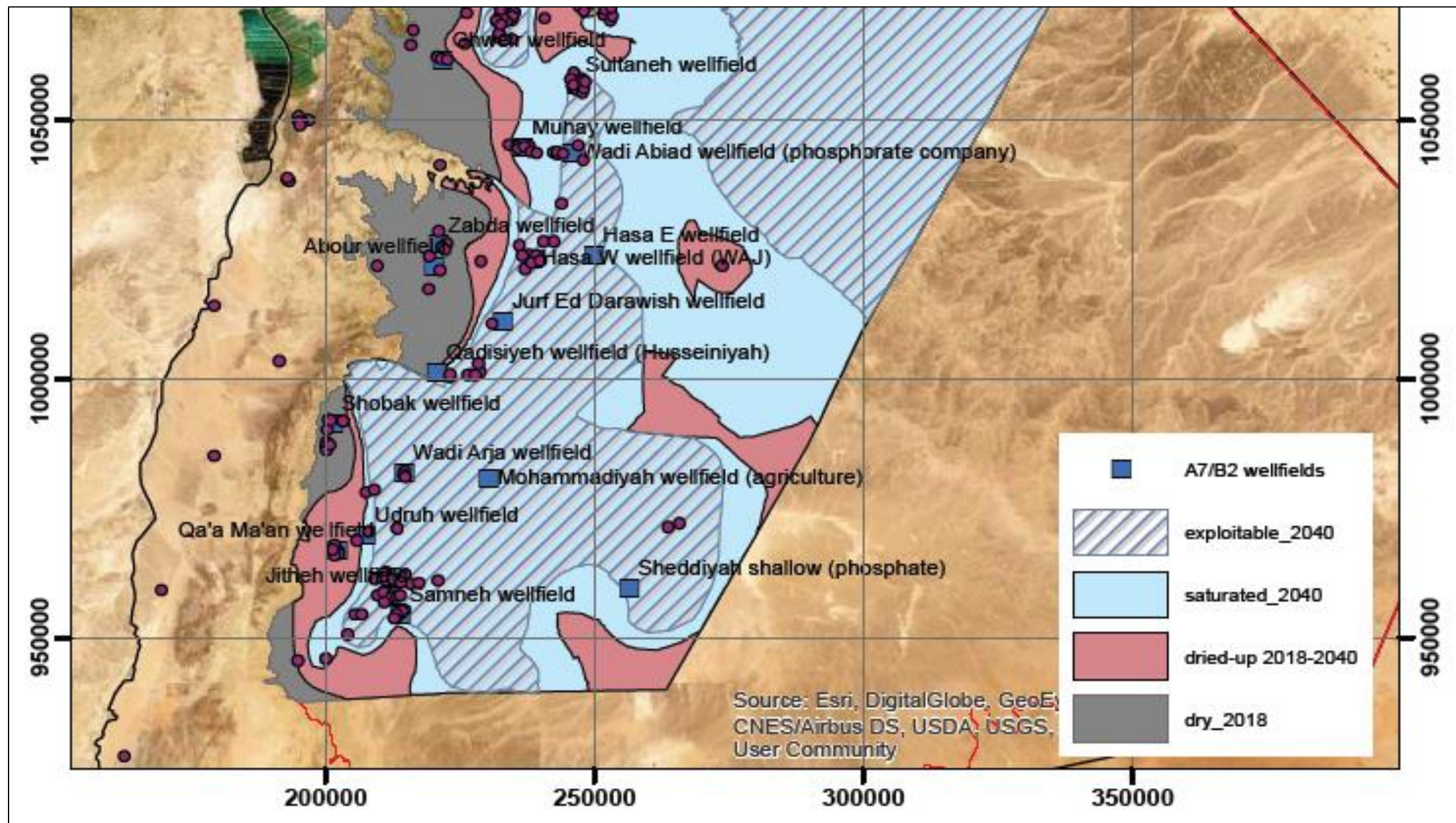
- Combination of rainfall, elevation, slope, distance to streams, type of soil, and land use/land cover



Ground Water

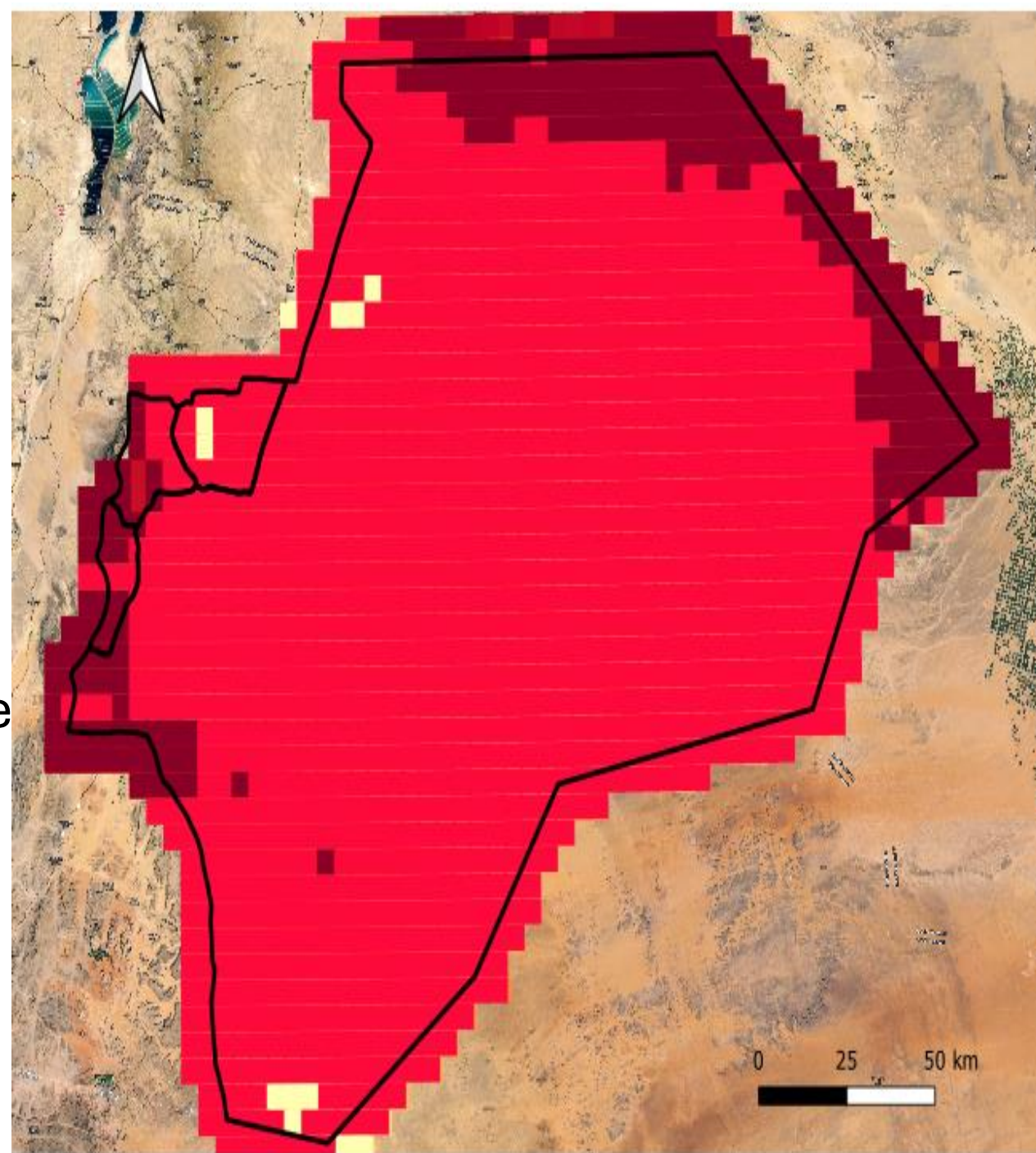
Extraction exceeds replenishment with high rates.

Well/Wellfield	Wells Production in m3/year in (1000)					
	2018	2020	2025	2030	2035	2040
Al-Jafr	1,039	987	856	725	594	463
Al-Modawwarah I well	168	168	168	168	168	168
Fujayj	744	521	-	-	-	-
HALET A'MMAR well	152	152	152	152	152	152
Huseiniya IA well	820	574	-	-	-	-
Huseiniya S74 well	86	68	22	-	-	-
Jitheh	1,896	392	69	-	-	-
Manshiyyeh	281	251	175	99	23	-
MREIGHA well	173	147	84	20	-	-
Qa'a	1,176	823	-	-	-	-
QREIN NO 4 well	236	165	-	-	-	-
Samna	2,124	1,578	363	-	-	-
Sateh Maan well	129	120	97	74	51	28
Shobak	1,229	1,095	764	431	99	-
Tahooneh	2,591	1,492	386	241	166	95
Tal Burma	1,016	922	687	452	218	-
Taqatqa Well	9	8	5	1	-	-
Athroh	620	535	326	118	-	-
Wadi Arja	711	607	343	127	-	-
Wheida no 2 well	473	419	284	149	14	-
Total	15,671	11,022	4,777	2,755	1,484	906



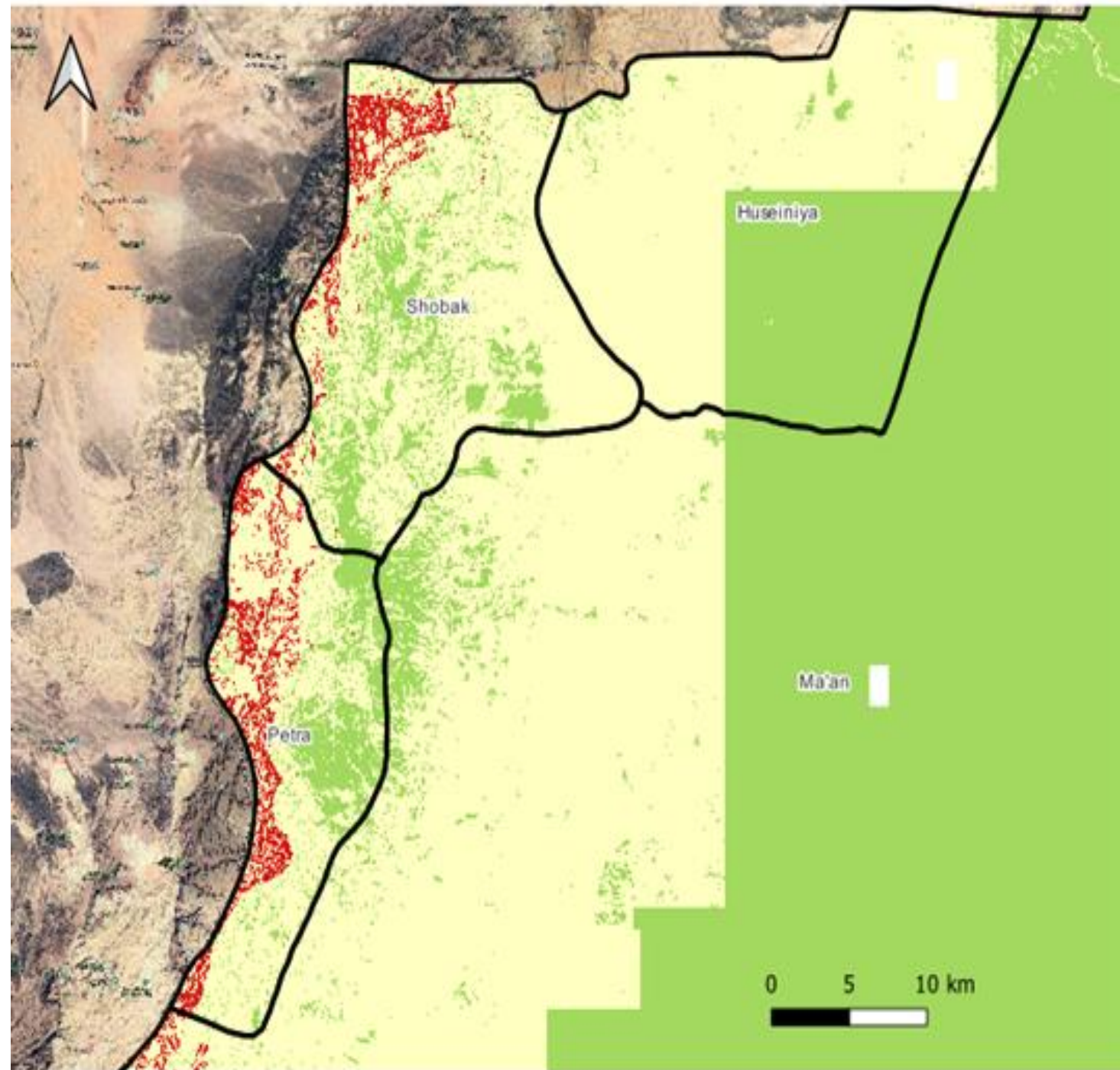
Drought

- Based on the SPEI index
- Climate change impact
- Drought is expected to impact groundwater resources and agriculture



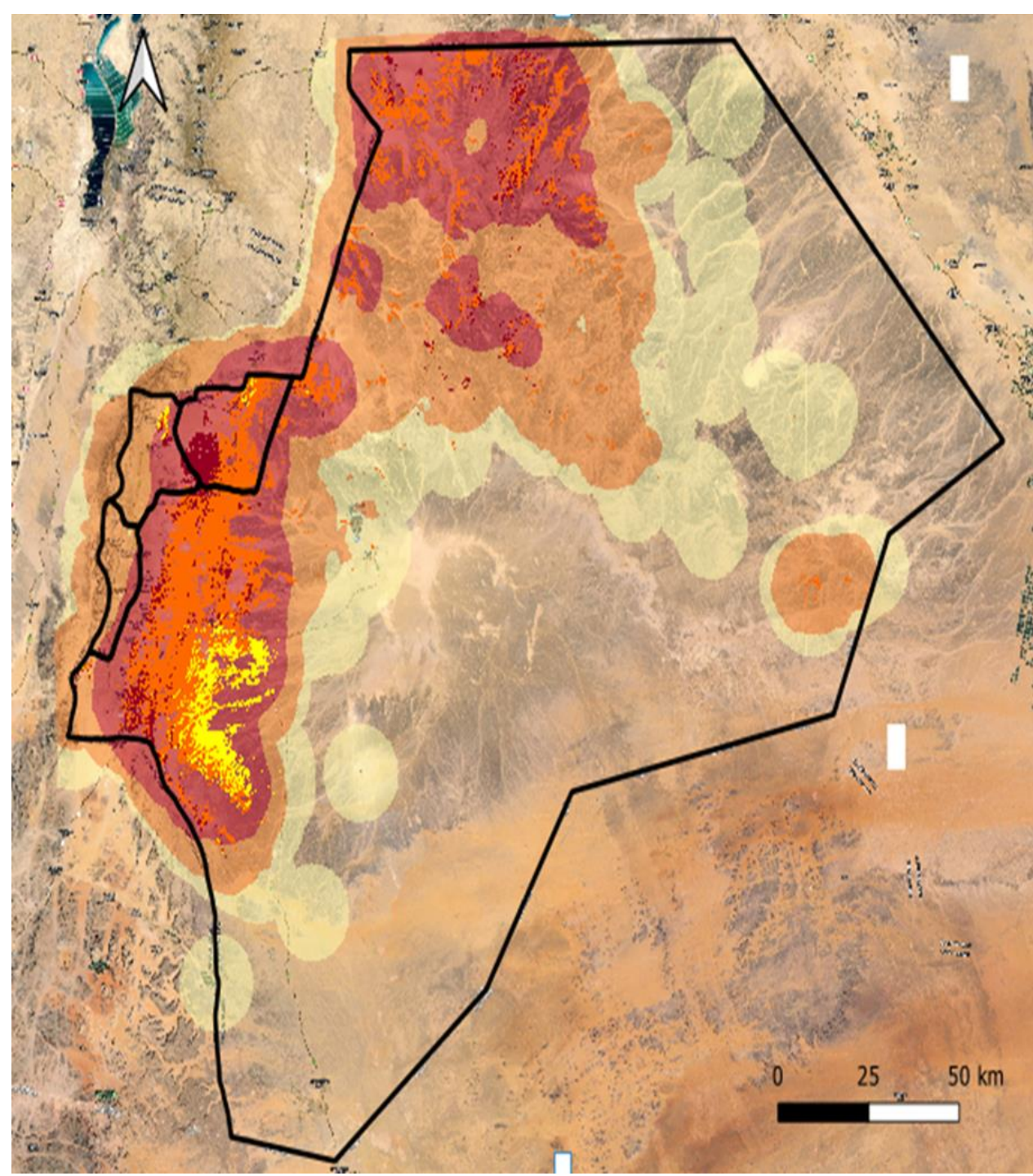
Landslide

- Landslide Hazard Evaluation Factor (LHEF) rating scheme.
- Lithology, slope, land use/land cover, geological structure, and hydrogeological conditions.
- Hazard Susceptibility
- Exposure.



Sand-storms

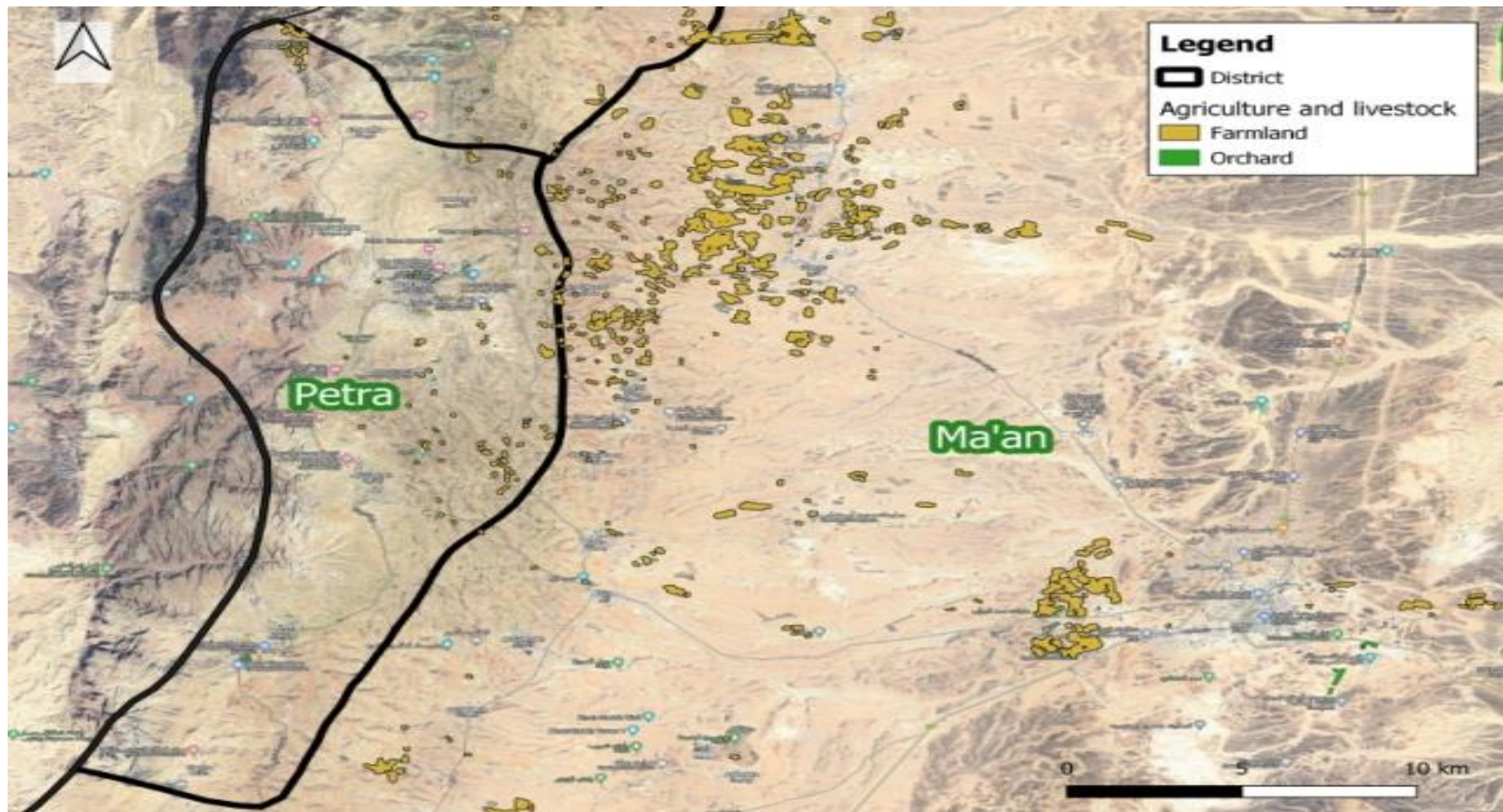
- Methodology was based on the UNCCD recommendations.
- Soil texture, structure, moisture, and bare soil surface.



Overall Risks Rating

Risk	Ma'an	Hussienah	Shoubak	Petra
Landslides	2.02	1.88	1.67	1.76
Flash floods	1.65 (*)	1.27 (*)	1.68	2.24
Droughts	2.81	1.73	2.32	1.82
Sand and Duststorms	4.49	2.94	2.64	2.44
Risk classes		Low Risk 0.3 – 1.5	Mid Risk 1.5 – 2.5	High Risk 2.5 - 5












0 500 1,000 m





Al Wahida Dam
and Catchment

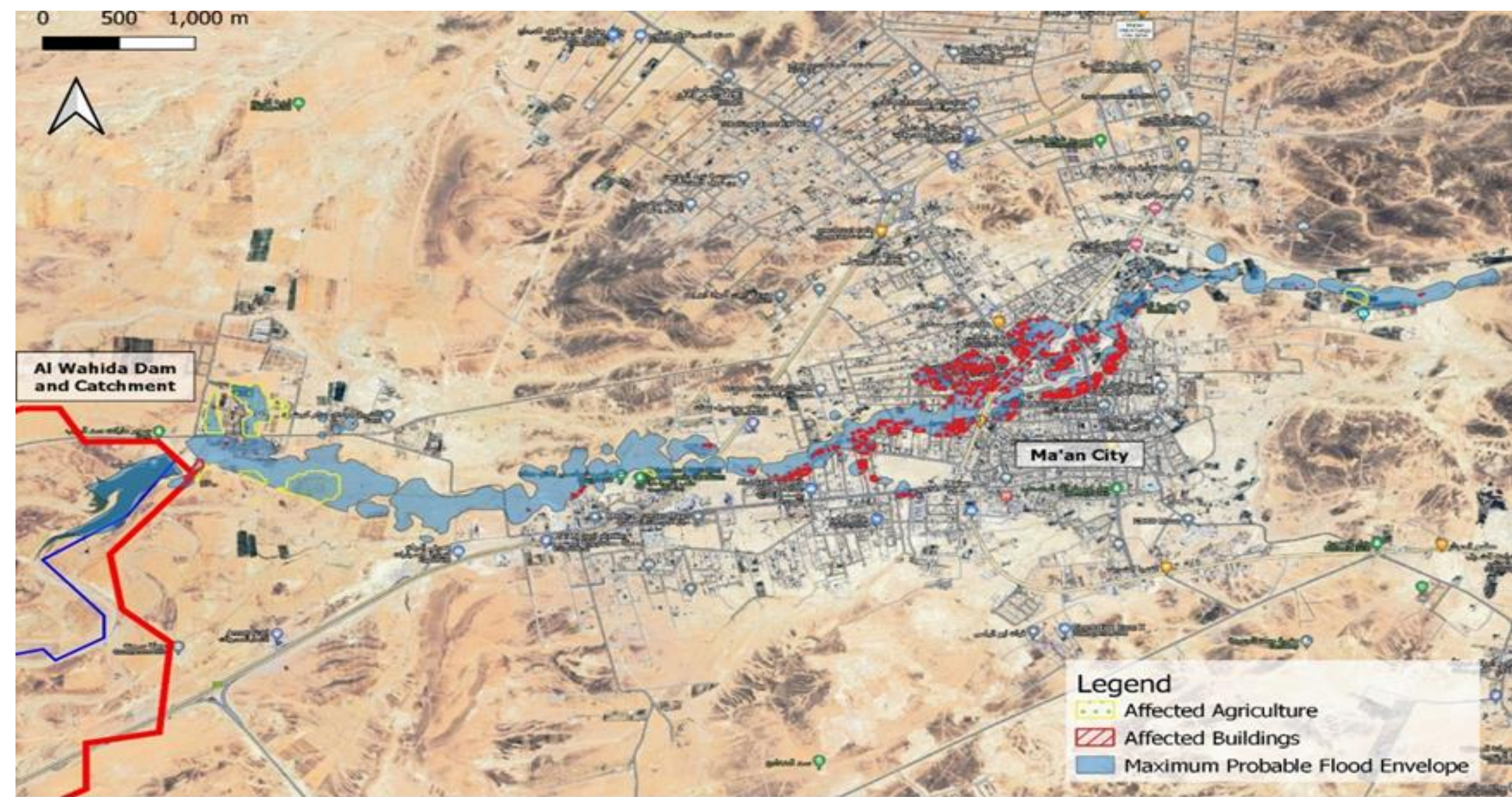
Ma'an City

Legend

 Affected Agriculture

 Affected Buildings

 Maximum Probable Flood Envelope



الفيضان المصعب في عمان

خلف عشرات القتلى والجرحى والوفى المشردين ودمر نصف المدينة!

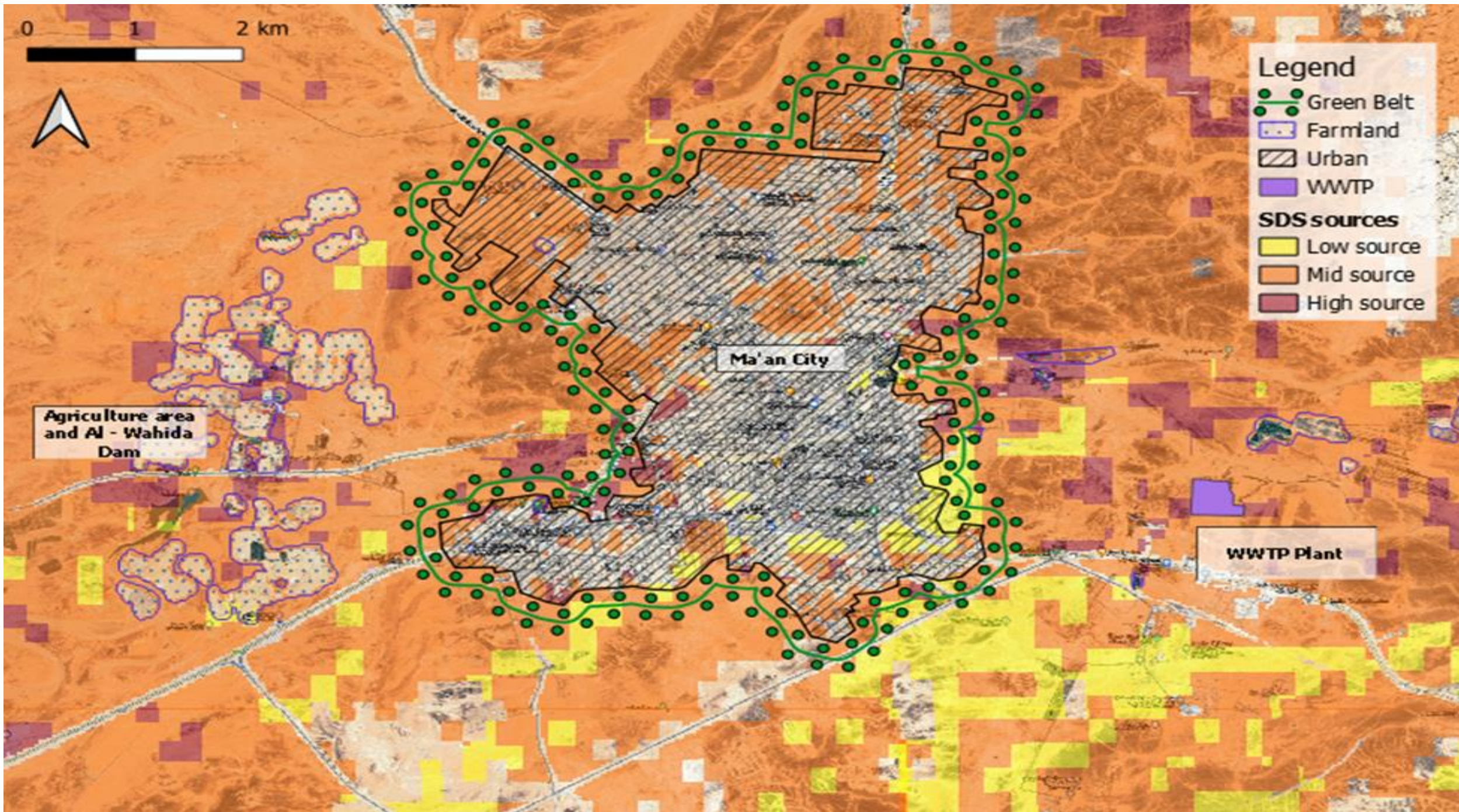


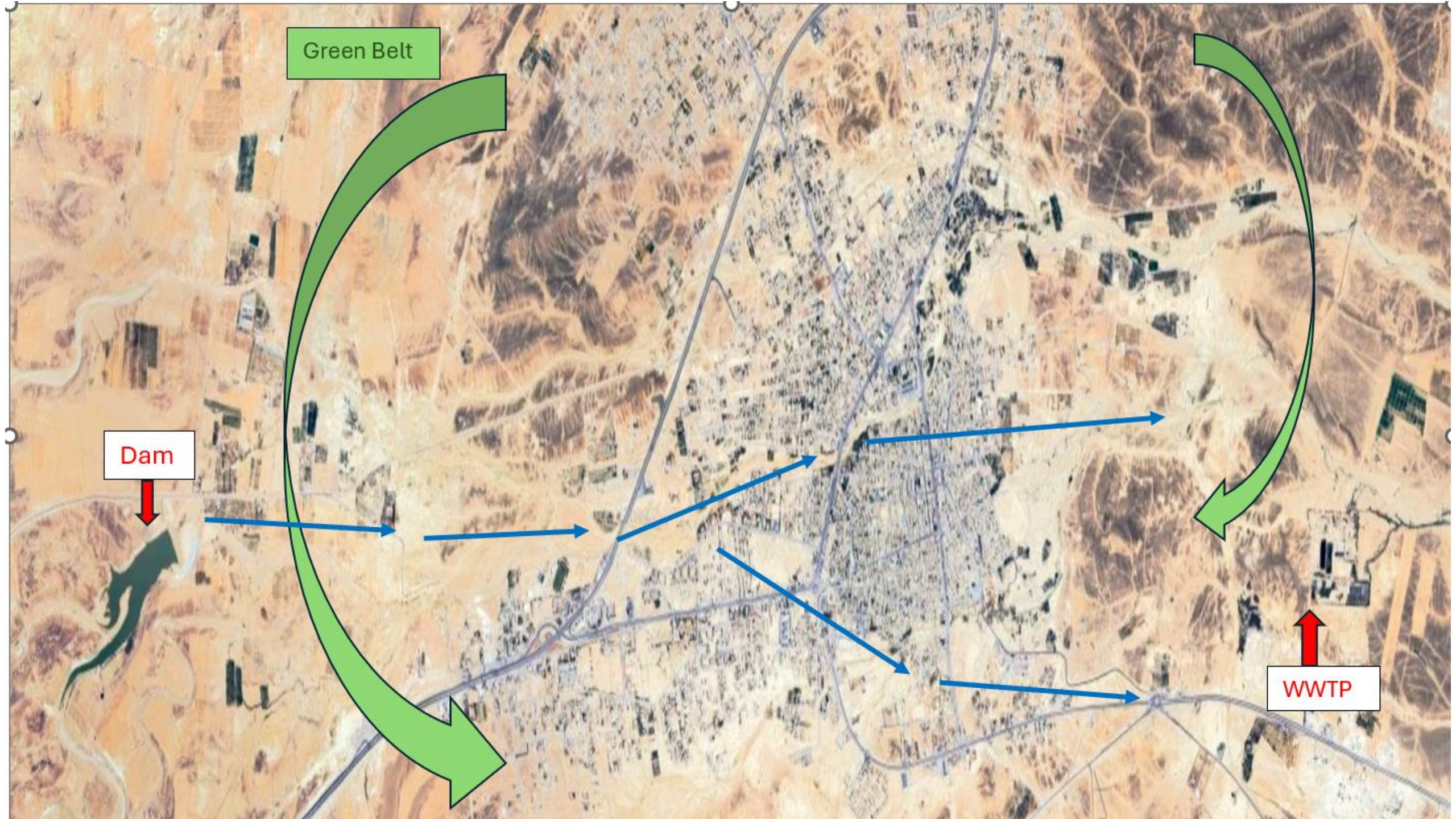
الهيئة العامة للغذاء والدواء











Green Belt

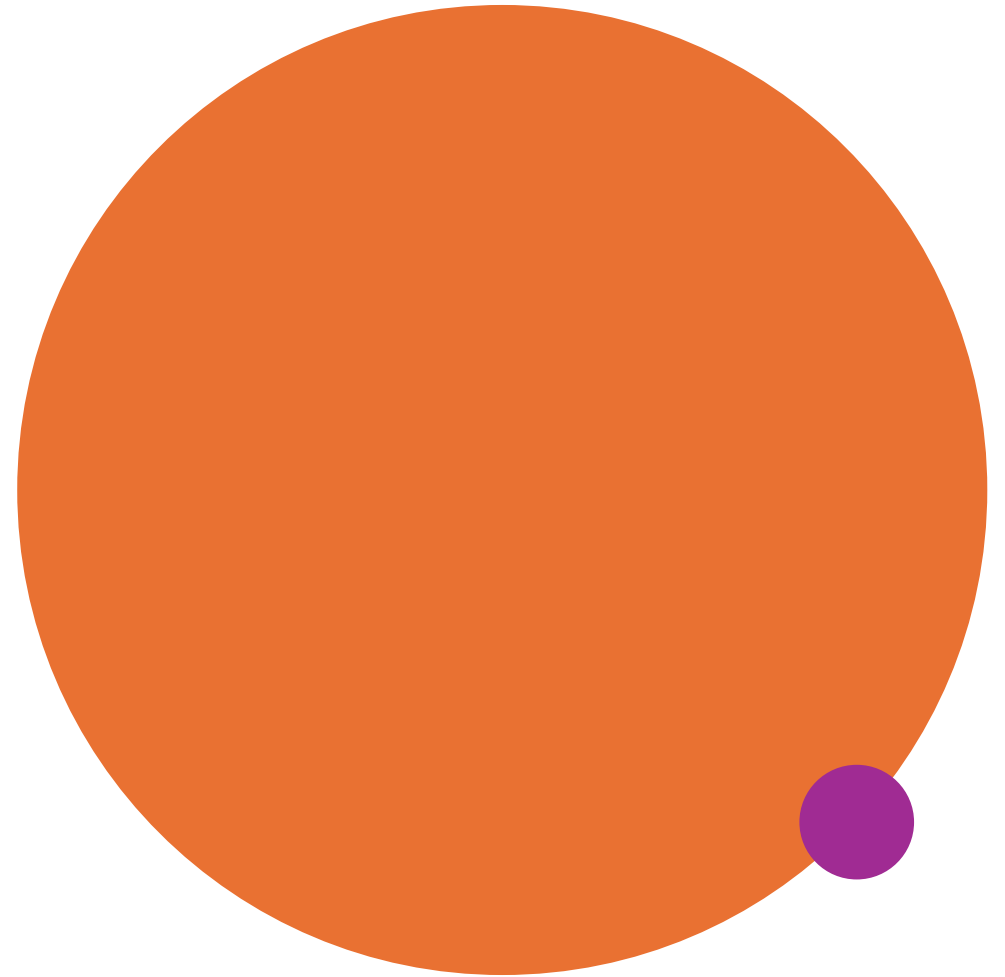
Dam

WWTP



• Humanitarian Dimensions:

- Shepards and sheep breeders east of Ma'an.
- Pastoralist in the eastern area.
- Bedouins and travelling tribes.
- International highway – desert highway.
- Frequent rescue operations in the eastern area.



Ma'an – Proposed Adaptation Measures

- Natural check dams and vegetation cover upstream and around Al Wahaidi dam.
(**Sand-storms+ Flash Floods+ Drought**)
- Reduce the impact of the recurrent sand-storms in the area through forestation and green belts around Ma'an city.
(**Sand-storms + Flashfloods + Drought**)

Ma'an - Socio-Economic Impact

- Avoided damages: total benefits for 10 years of risk reduction is of approx. 6 million JOD.
- Livelihoods and economic opportunities.
- Health, traffic, and living conditions.
- CO2 Sequestration:
 - Number of trees: 40,000.