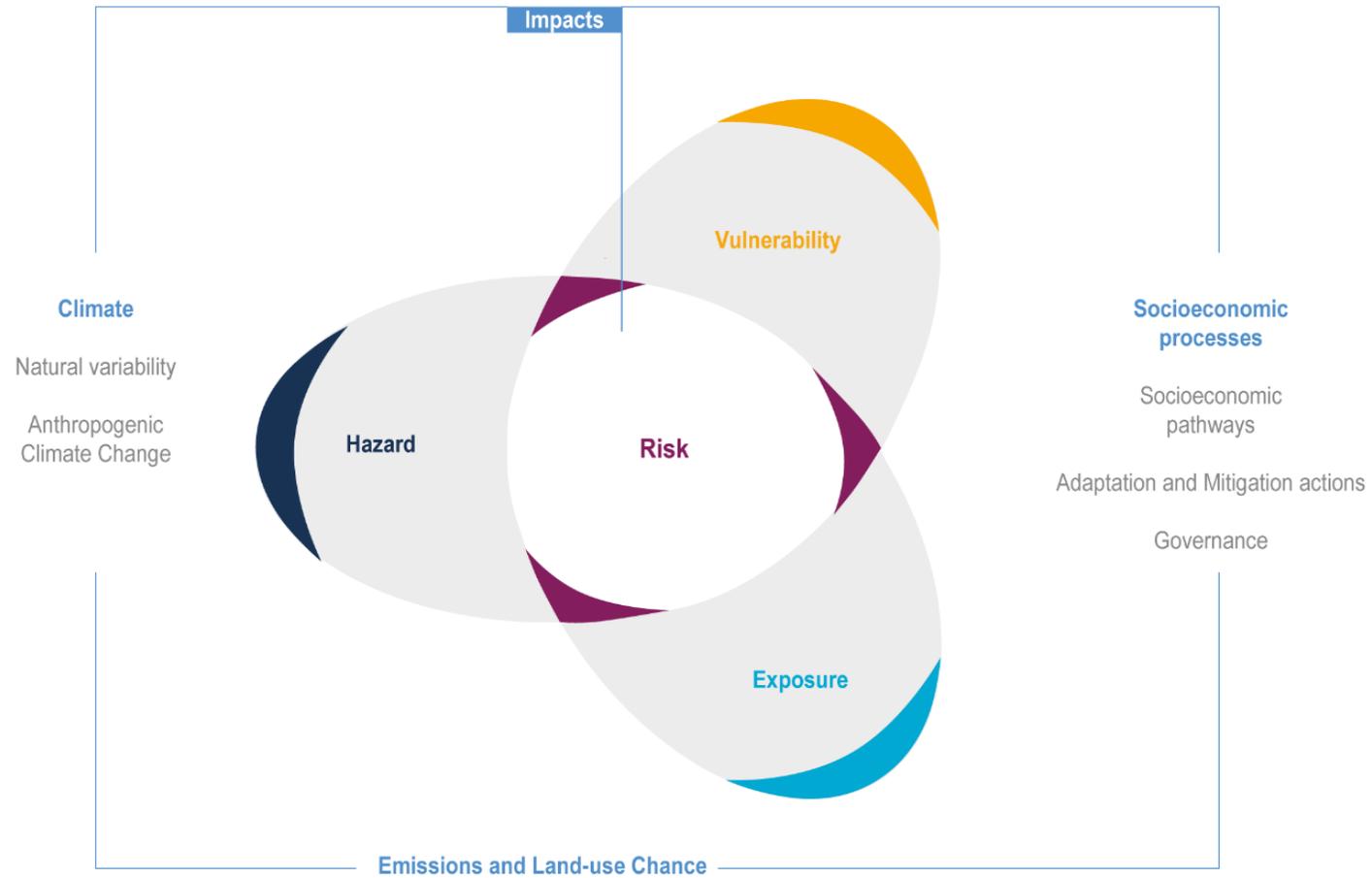


Climate Resilience and Disaster Risks Reduction in Ma'an Governorate



Climate Risk Assessment

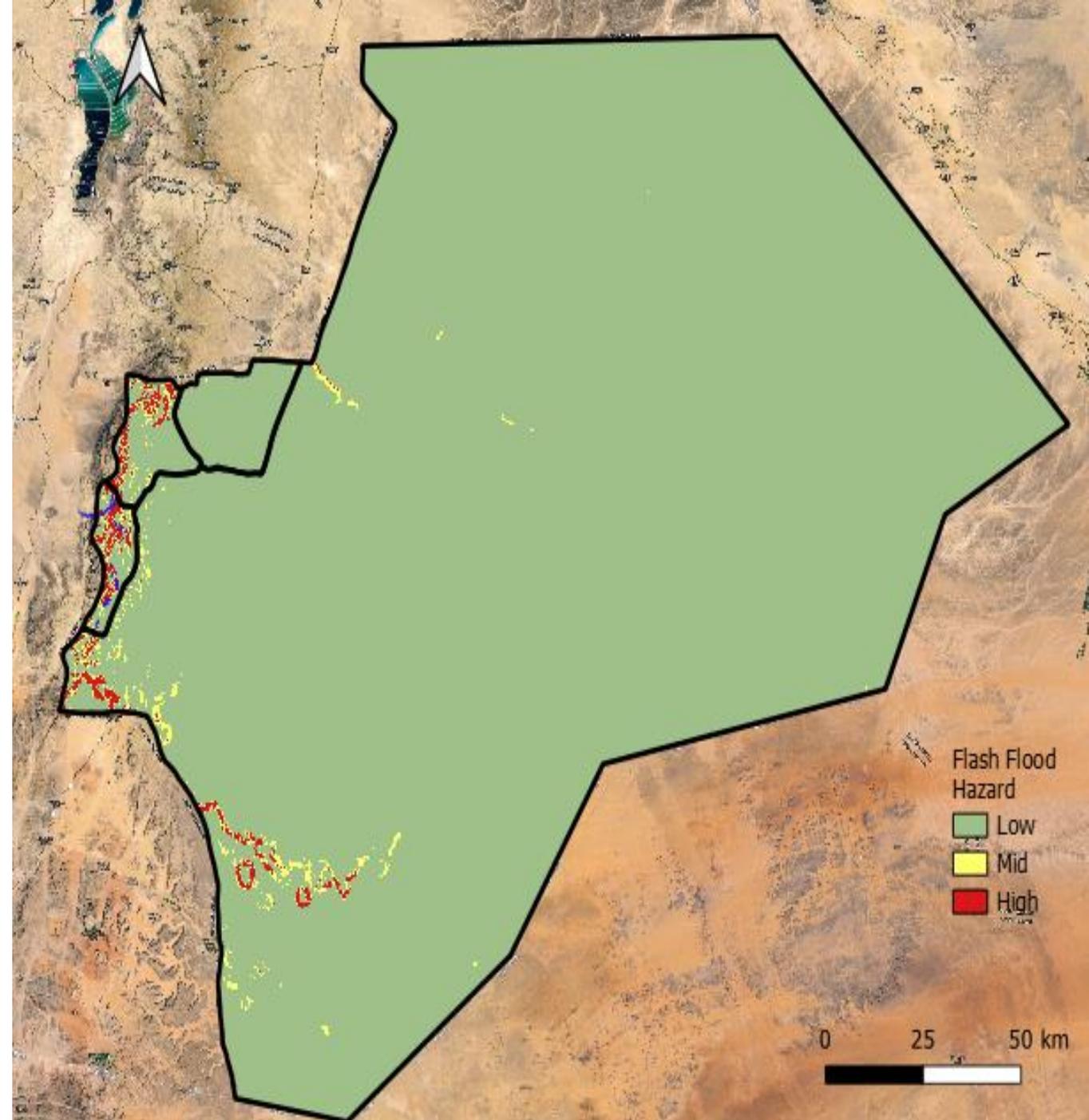
-
- Landslides
 - Droughts
 - Dust-storms
 - Flash-floods
-
- Risk = Hazard x Exposure x Vulnerability.
 - Vulnerability is assessed via sensitivity and adaptive capacity.



IPCC Climate Risk Assessment Framework

Flash-Floods

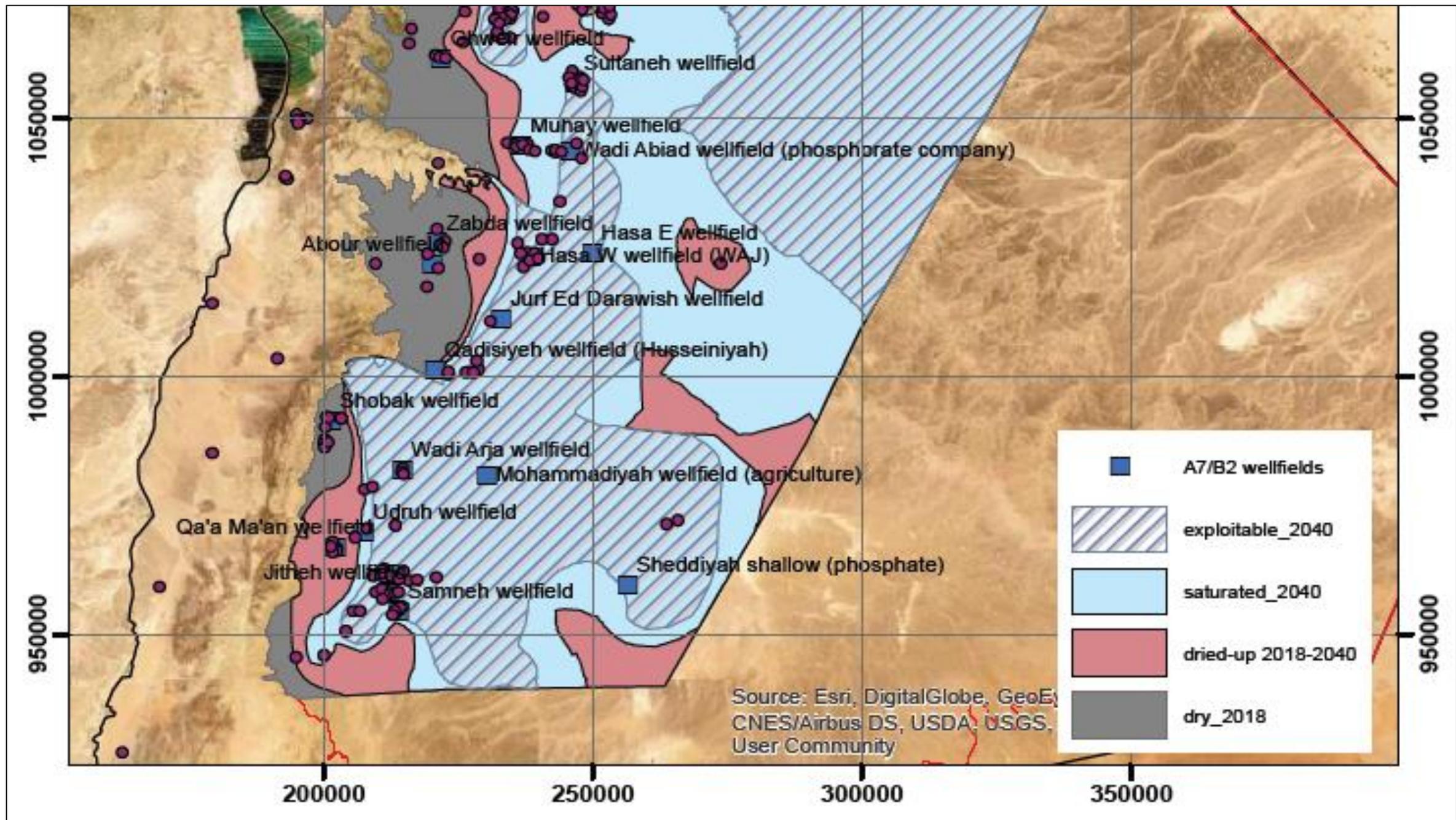
- Combination of rainfall, elevation, slope, distance to streams, type of soil, and land use/land cover



Ground Water

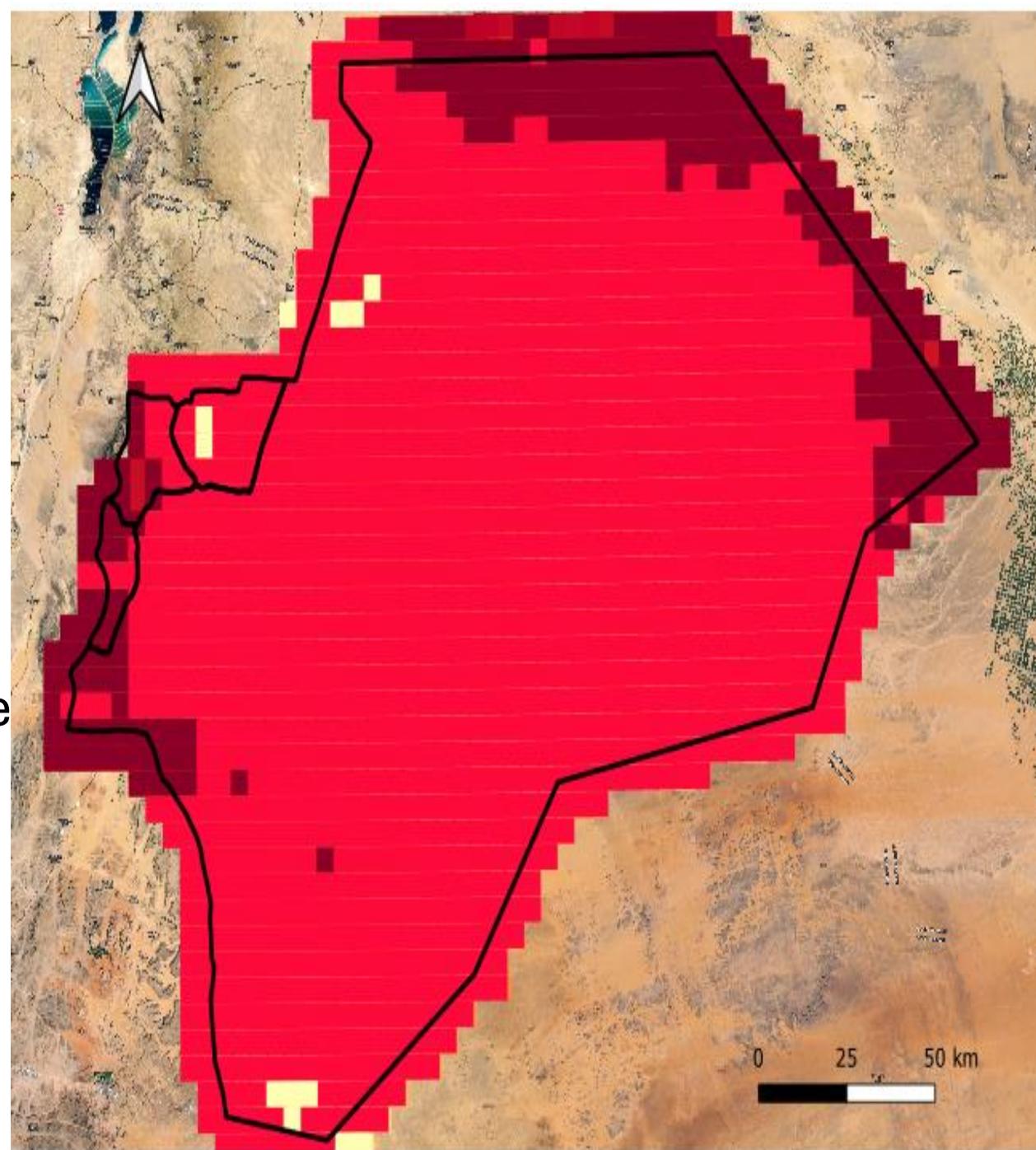
Extraction exceeds replenishment with high rates.

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



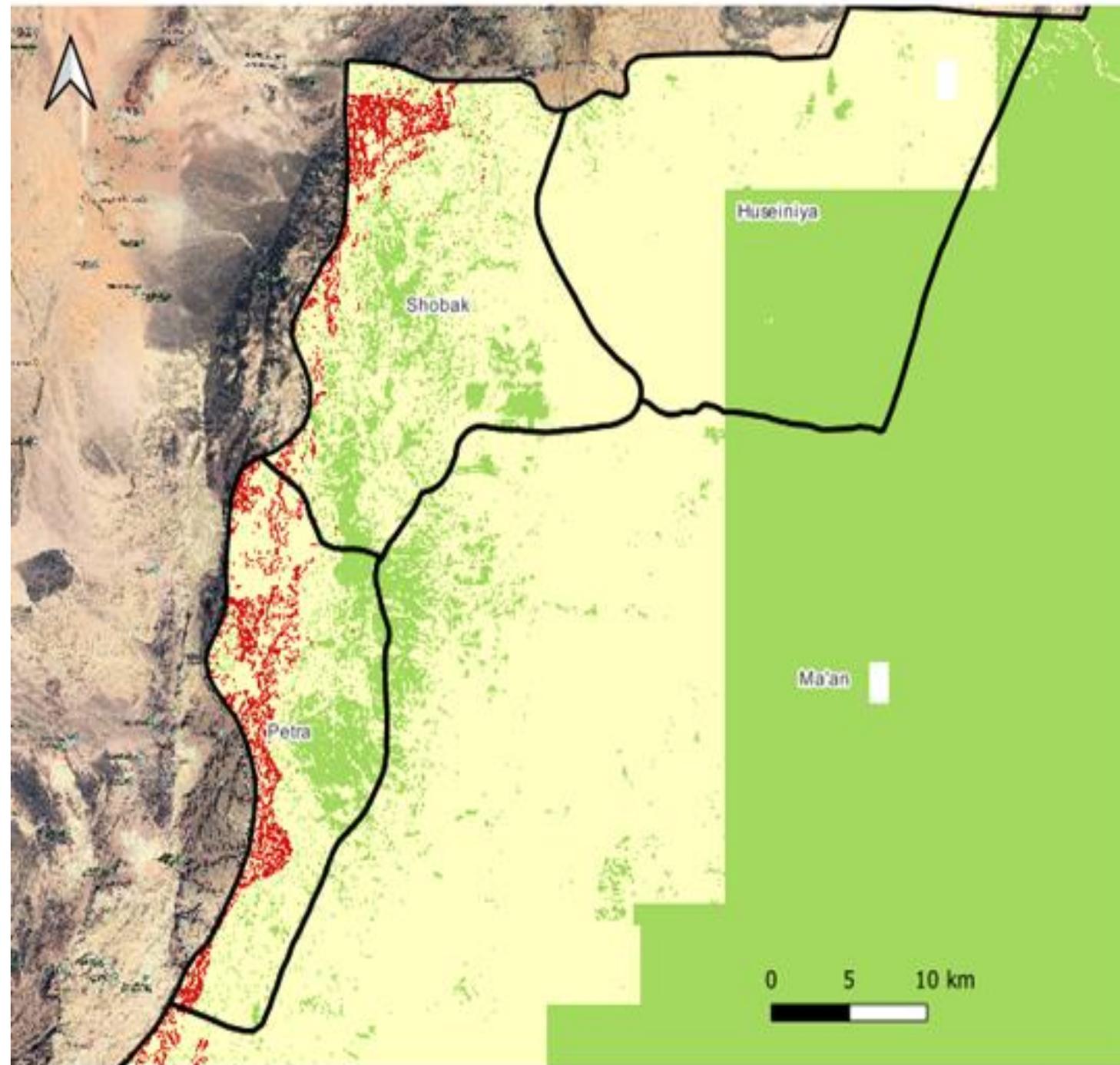
Drought

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



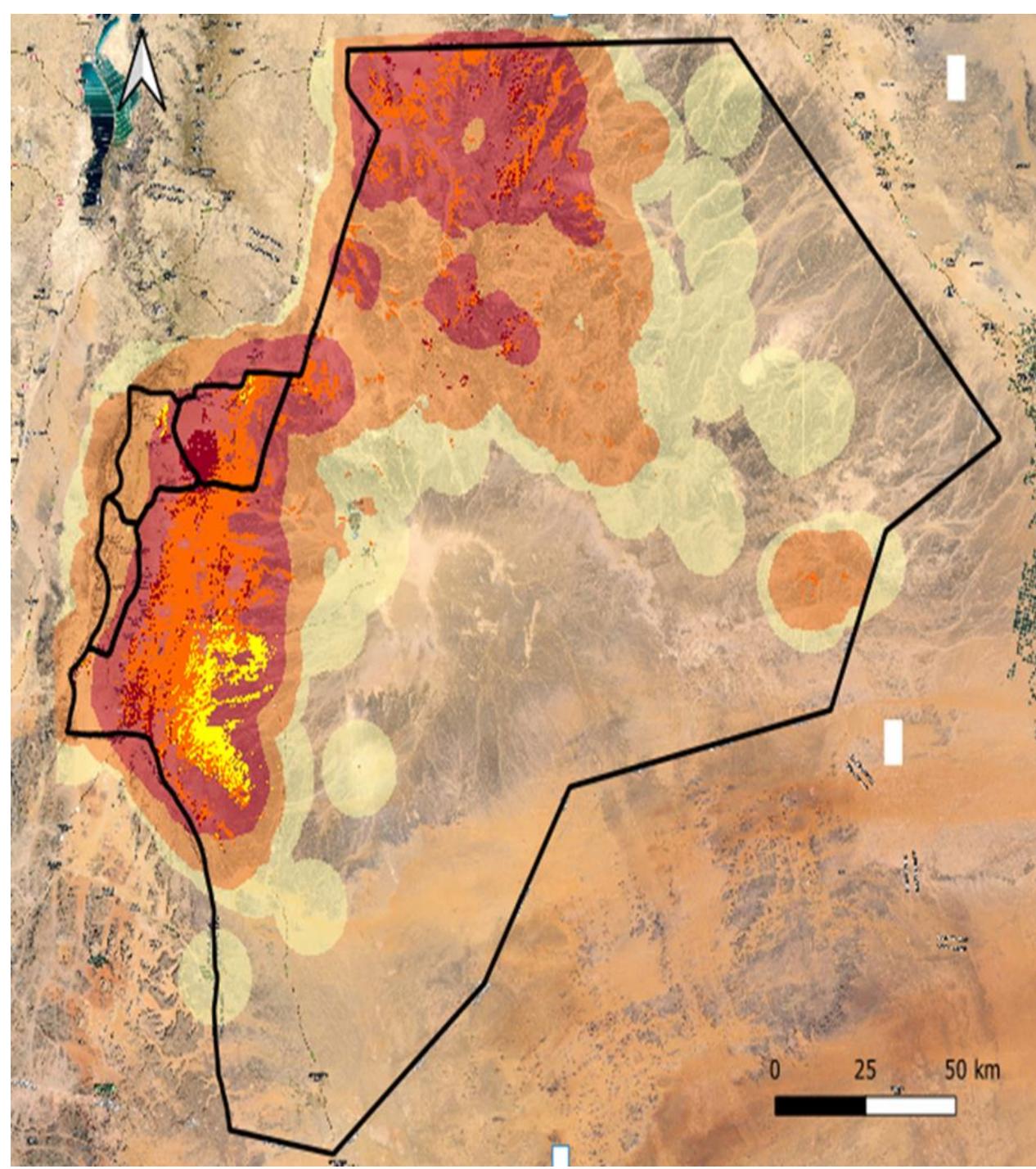
Landslide

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



Sand-storms

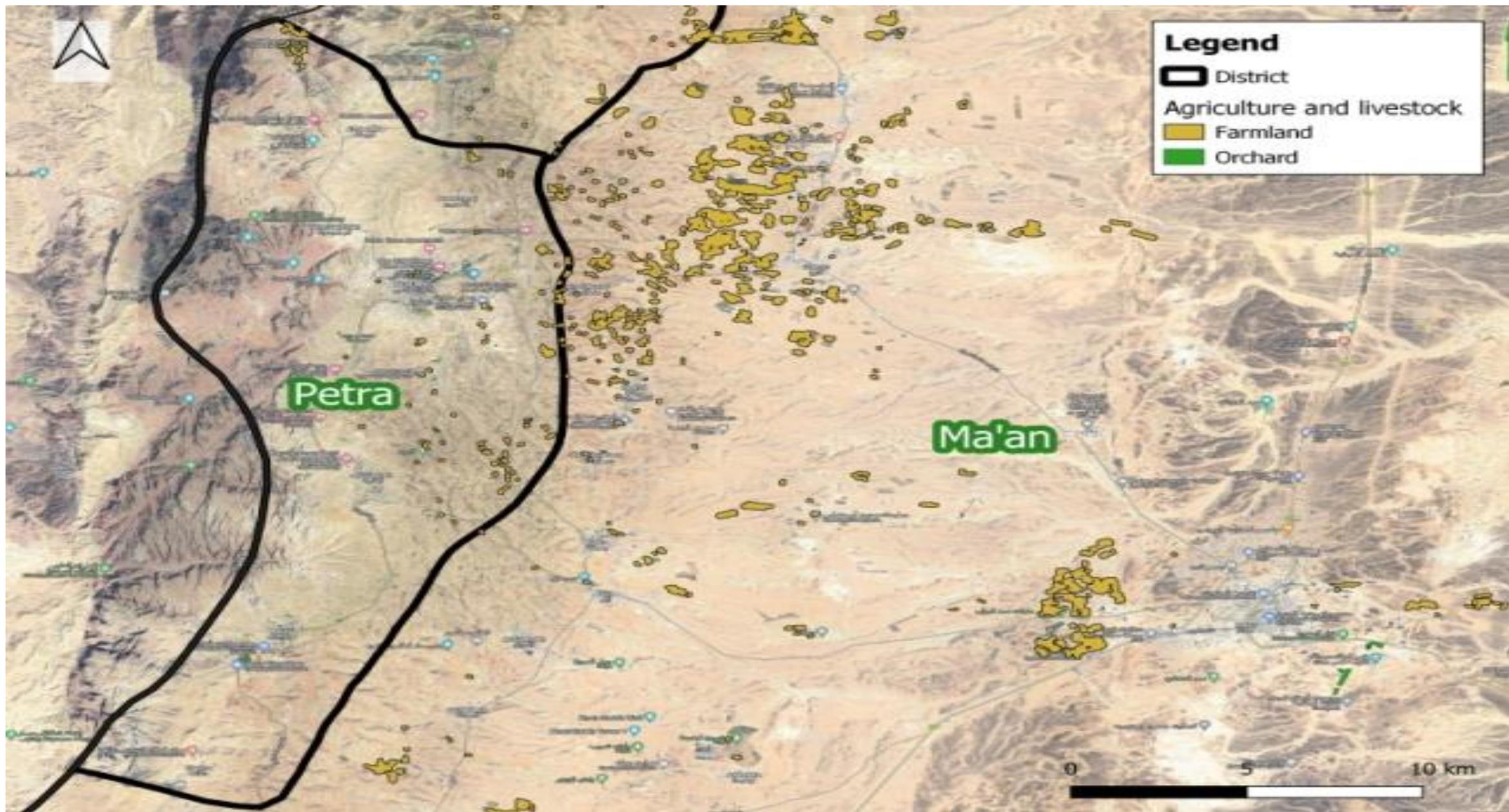
- Methodology was based on the UNCCD recommendations.
- Soil texture, structure, moisture, and bare soil surface.



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	Mid Risk	High Risk
		0.3 – 1.5	1.5 – 2.5	2.5 - 5











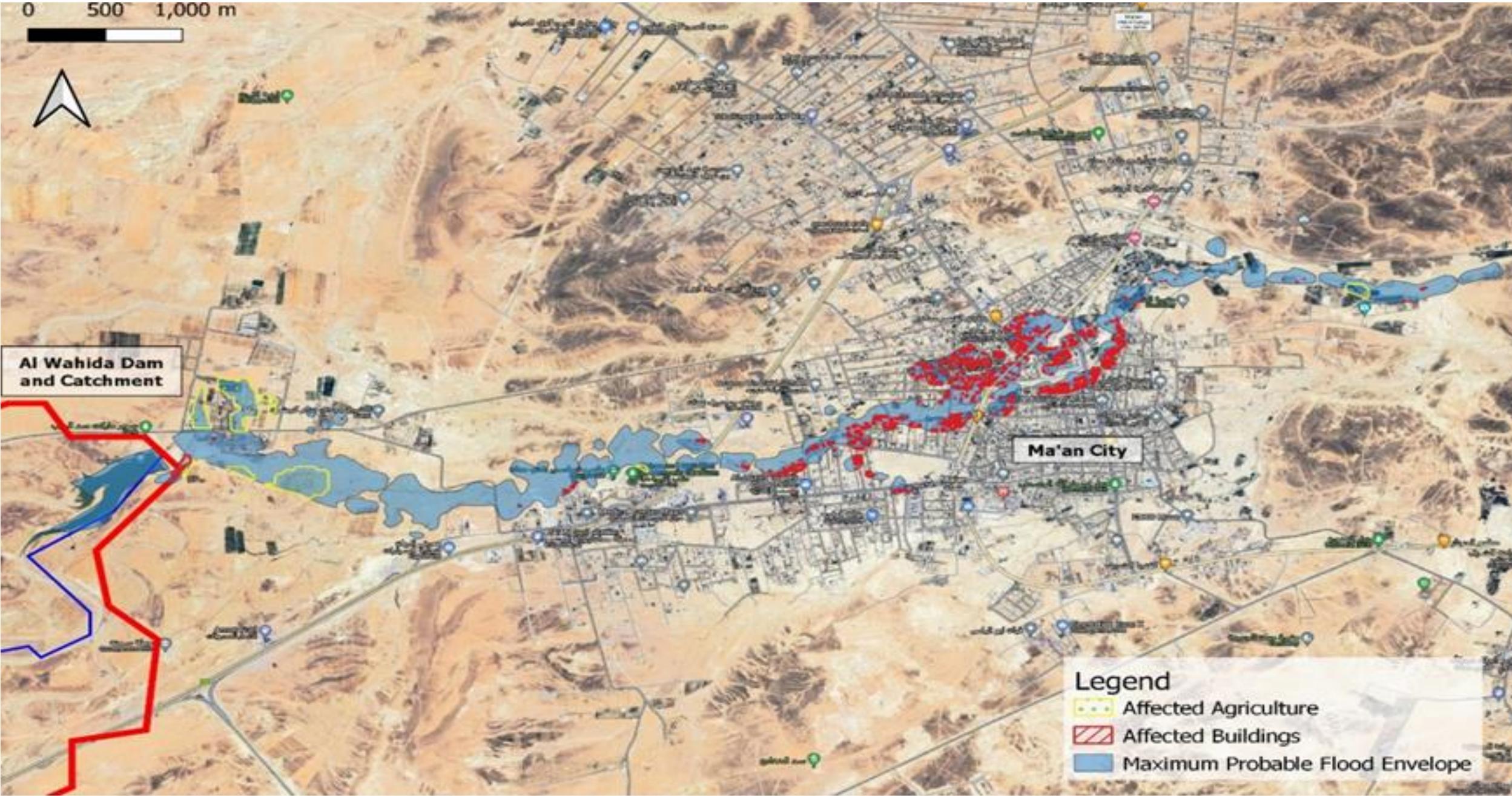
0 500 1,000 m



Al Wahida Dam and Catchment

Ma'an City

- Legend**
- Affected Agriculture
 - Affected Buildings
 - Maximum Probable Flood Envelope



الفيضان المصعب في عمان

خطف عشرات القتلى والبحري والوفاء المشردين ودمر نصف المدينة!

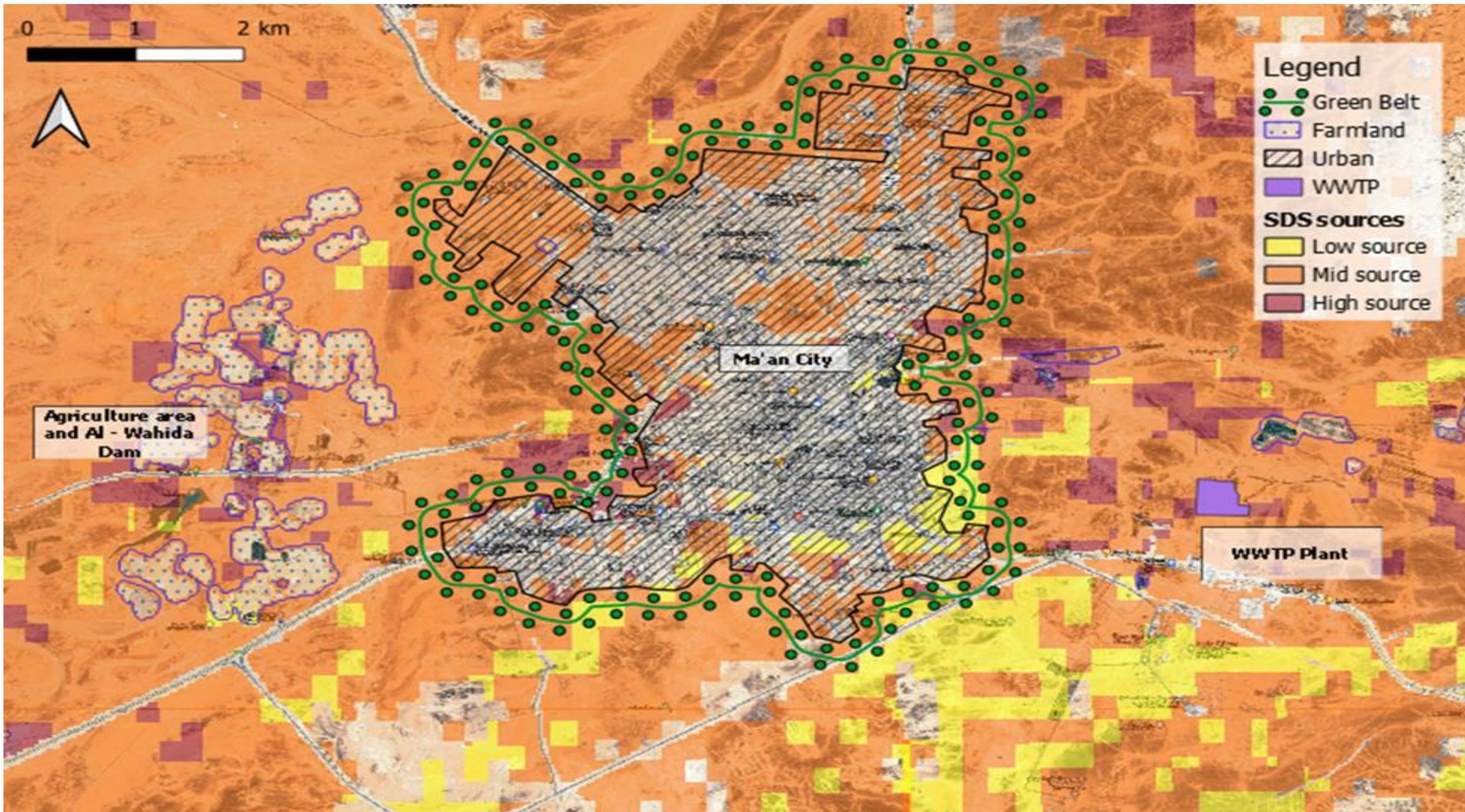


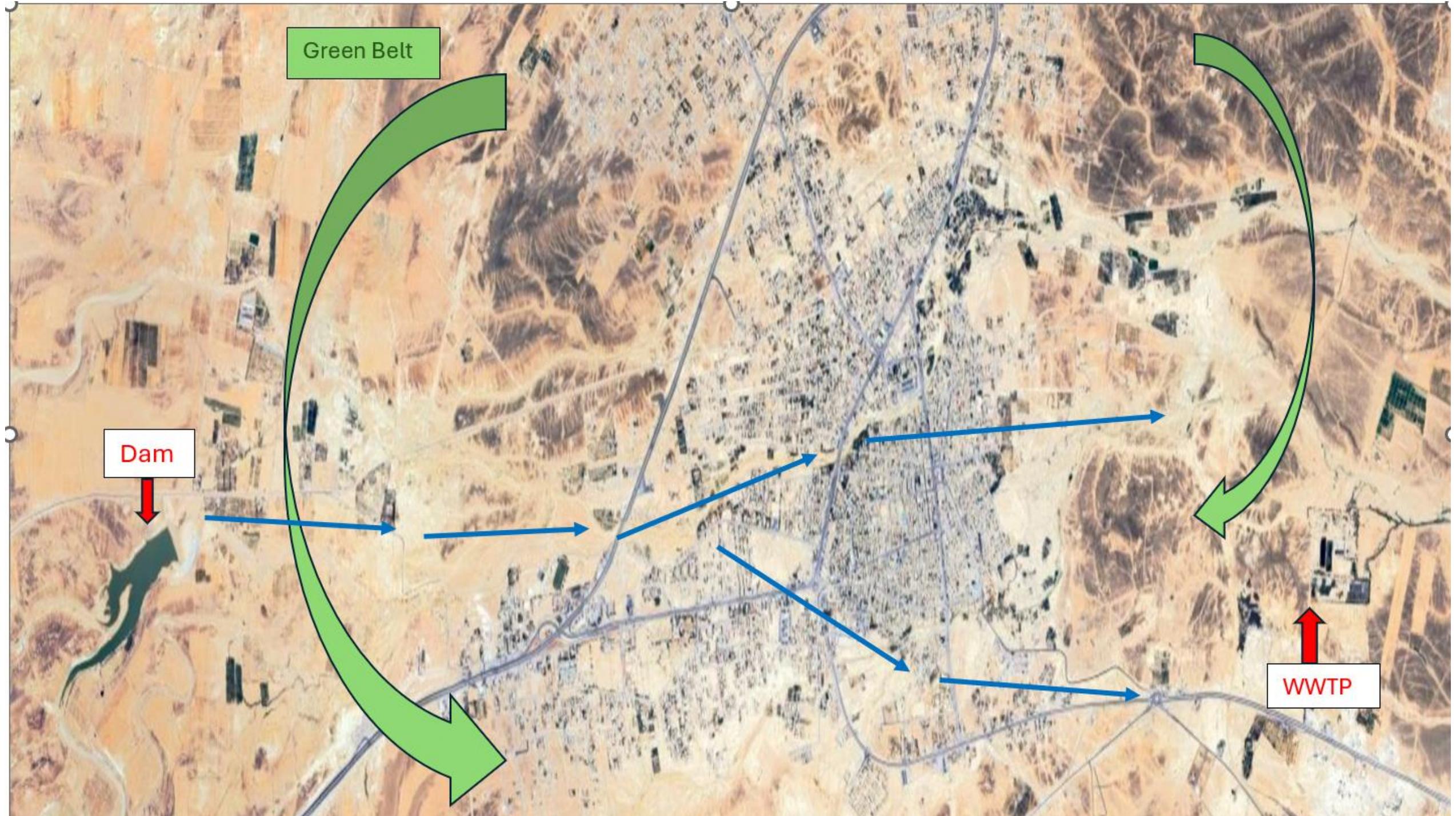
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Green Belt

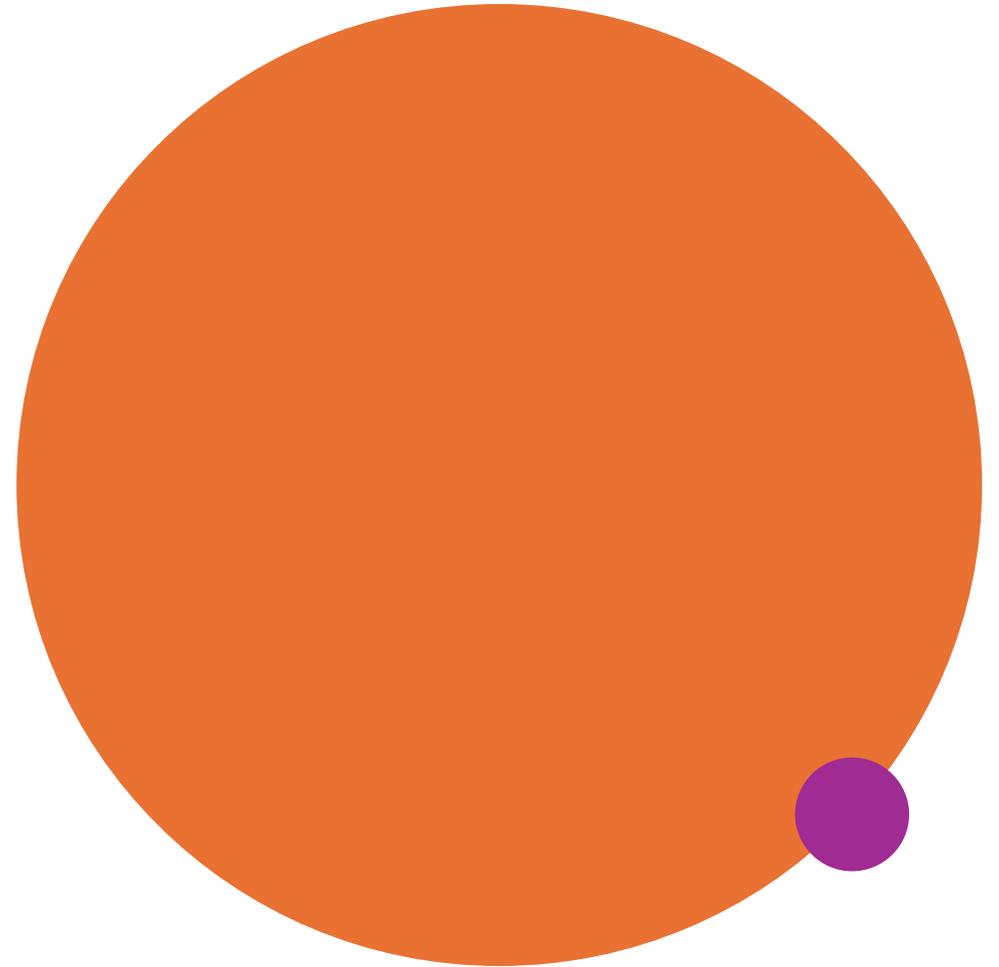
Dam

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.