Regional pathways out of national water scarcity: a regional analysis of water resources of Israel, The Palestinian Authority and Jordan.

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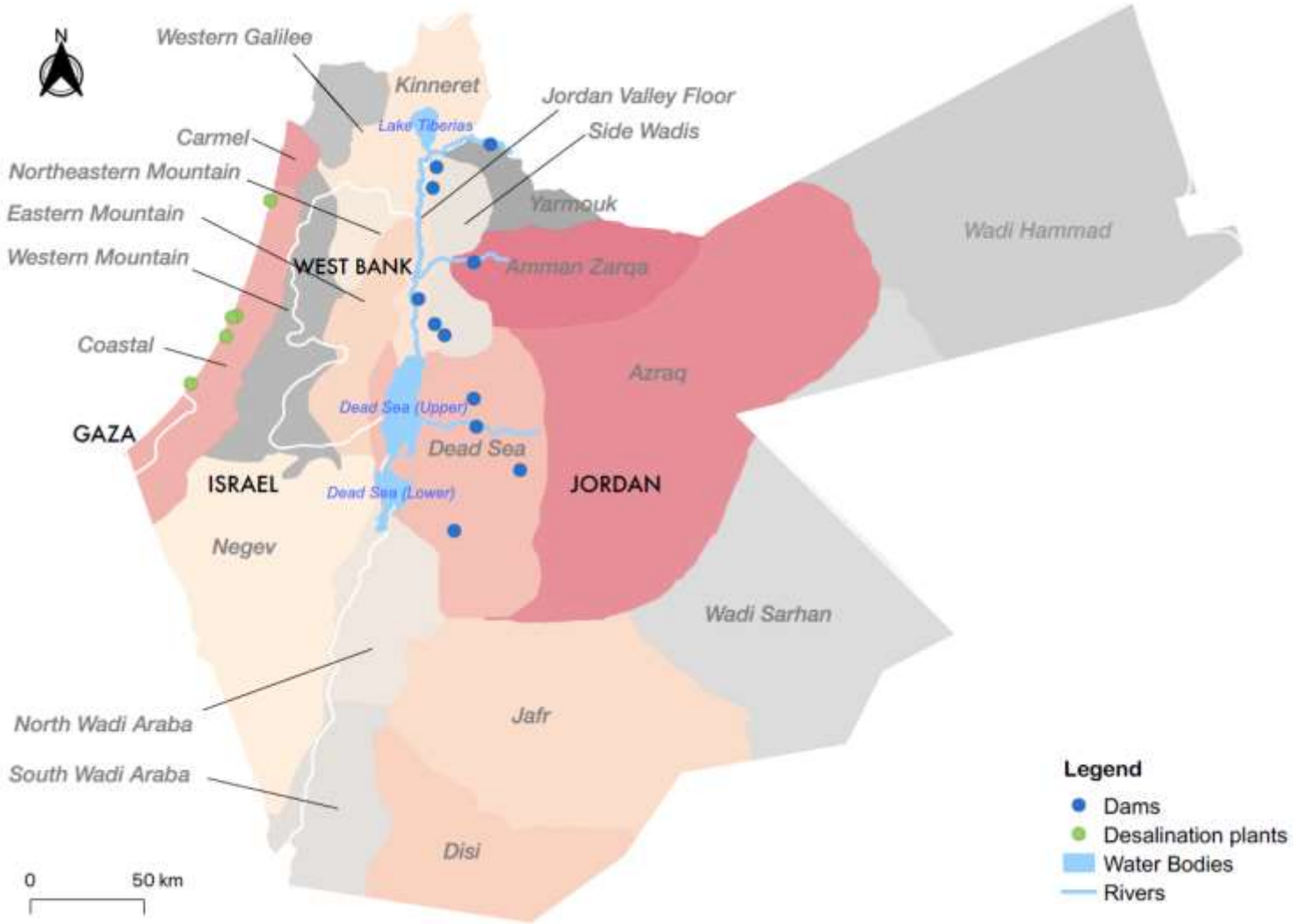
Purpose of Study

- Jordan Basin Region (Israel, Palestinian Authority and Jordan) are jurisdictions which have made progress in increasing water security in recent decades, but significant regional deficit remains
- However significant uncertainty (scientific and political) over available resources, and gaps in planned future resources and forecast demand.
- This study attempts to review available resources and current national policies in order to highlight gaps in planning for 2030
- We also aim to highlight opportunities at the regional scale to bridge those gaps in the medium term

Key Issues

- Significant water scarcity (Jordan 110m3/cap/yr, Israel 256m3/cap/yr, Pal 84m3/cap/yr)
- Current water scarcity exacerbated by climate change up to 2030 including 10% reductions in Israel and Palestinian Authority and 4-8% in Jordan, and insufficient plans for new capacity
- Water and environmental insecurity are no longer national risks, but regional threat multipliers, compounded by climate change. (cf regional impact of Syrian refugees)
- Regional water insecurity therefore poses threats to national security across countries.
- Opportunity to deliver regionally cooperative solutions based not on desire for cooperation *per-se* but rather by enlightened self interest.

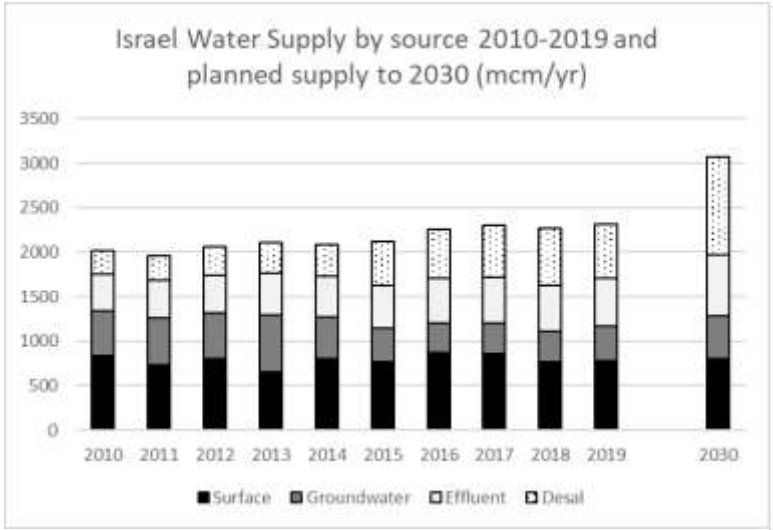
Regional Overview

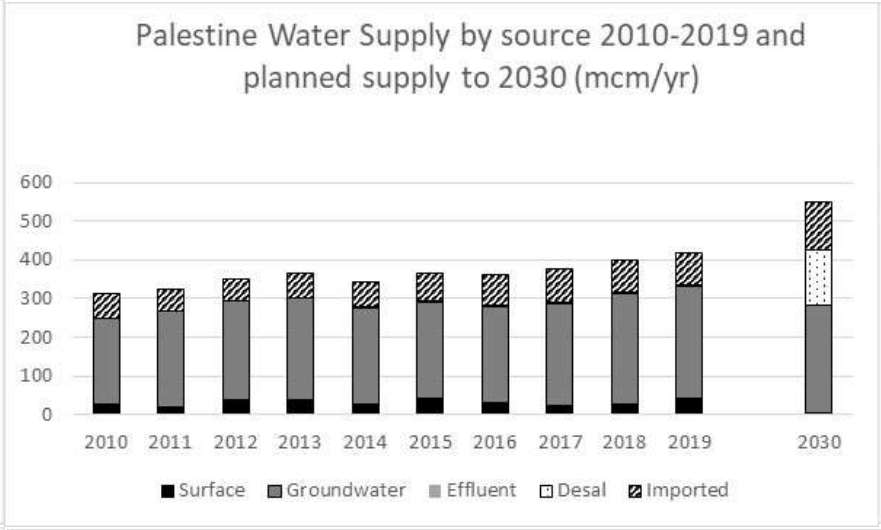


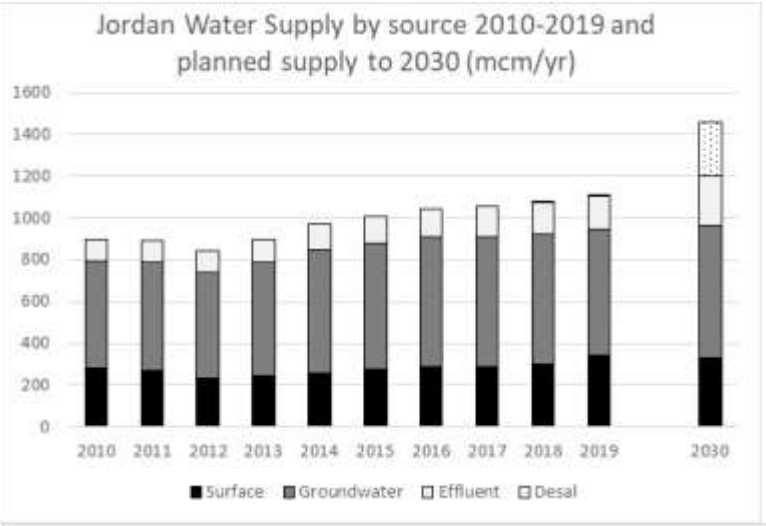
Methodology pt1 – Review of existing resources

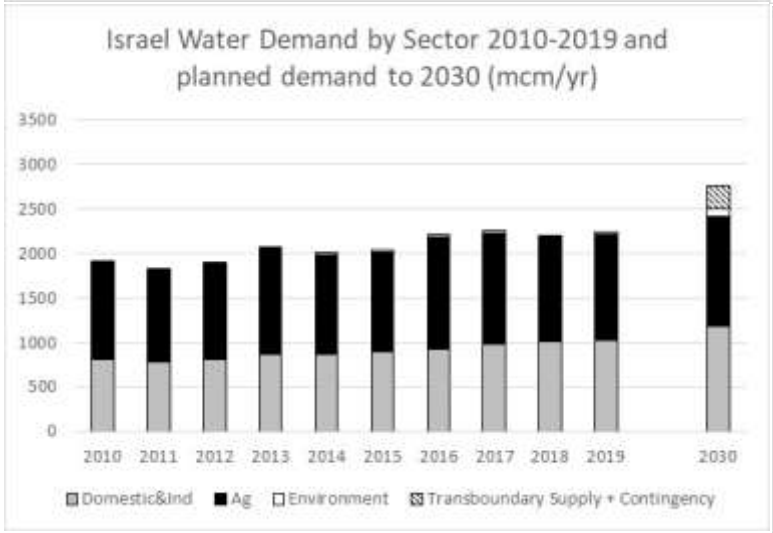
Water Resources West of River Jordan						
Water Resource	Oslo	IWA 2012	UNECWA	Average across sources		
North Eastern Aquifer	145	134		139.5		
Western Aquifer	362	333	385	360		
Eastern Aquifer	172	174		173		
Kinneret Watershed/Jordan Basin		526	457	491.5		
Western Galilee Basin		158		158		
Carmel Basin		35		35		
Coastal Basin natural inflows (fresh and saline)		230	247	238.5		
Gaza inflows (excluding seawater intrusion)		70	71	70.5		
Lower Galillee Basin		26		26		
Negev/Arava Hazeva group		15.7		15.7		
Negev/Arava Judea Aquifer		12.5		12.5		
Negev/Arava Kurnum Aquifer		3.4		3.4		
Total				1723.6		Average Oslo 1994, IWA 2012, UNESCWA 2013
				1887		Attili 2004,
				1491-1791		EcoPeace 2020
				1853		Chenoweth 2011, citing Israeli sources
				2634		Chenoweth 2011, citing Palestinian sources
Water Resources East of River Jordan (Jordan)						
				Renewable Resources	Fossil Groundwater	
Fossil Groundwater					143	
Renewable Groundwater				275		
Surface Water				263		
Total (renewable)				538		MWI 2016
				853		MWI 2018
				650		Raddad 2005
				850	77	Khaleq 2008
				620	91	MWI 2009
				550-600		
Regional TOTAL Renewable				2261.6		Sum of Jordan MWI 2016 and Averaged sources in Isr/Pal (1723 + 710 mcm)

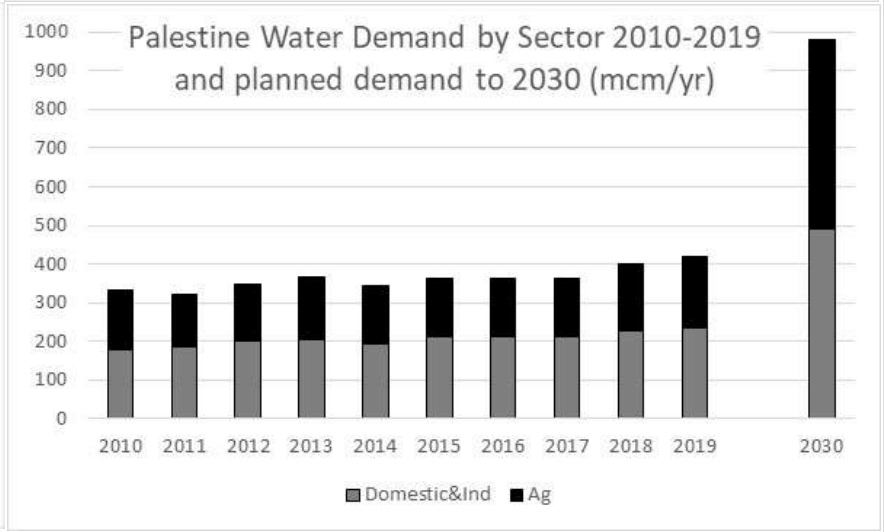
Methodology pt2 – review of current plans

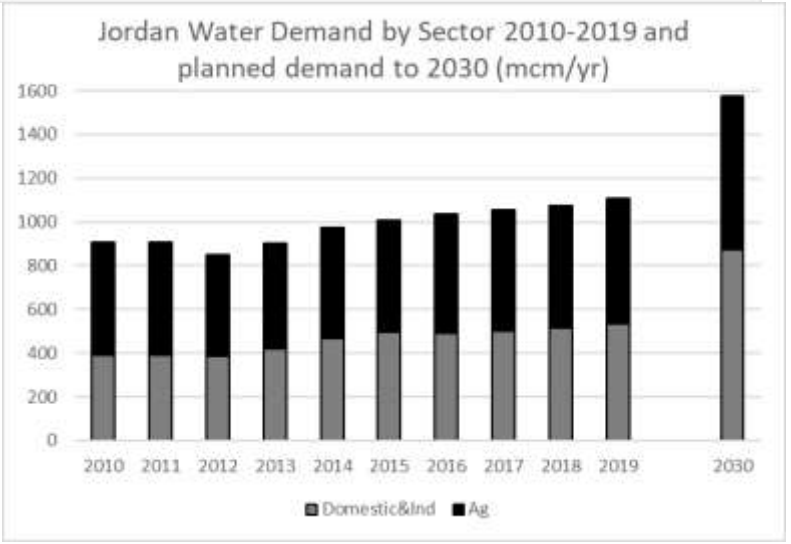












2030, 300mcm/yr Surplus (mainly desal capacity) – accounts for climate change

2030, 430mcm/yr deficit.
Does not account for climate change

2030, 116mcm/yr deficit (assuming 260mcm Aqaba desal link delivered).
Does not account for climate change

Results: Agriculture and Desalination scenarios

- Agricultural futures:
  - Israel 53% water (50% effluent) to produce 48% of food
  - Palestine 51% of water to produce 38% of food
  - Jordan 44% of water to produce 47% of food.
  - Potential to reduce domestic agricultural production to bridge gap – Jordan 25% cut. Palestine 100%+ cut (insufficient).
  - Significant social and political ramifications of such reductions
- Desalination
  - Jordan would need 116mcm ontop of planned 260mcm, which itself may not be delivered on time (2025-2030).
  - Palestine would need 400mcm of desalinated water, including significant conveyance from coast in Gaza to West Bank

Results: Treated Wastewater scenario

- Increasing domestic wastewater recovery and reuse levels (benchmark Israel@60% reuse of domestic total) (based on 2030 available supply):
  - Jordan increase in reuse from 30% to 50% would yield extra 130mcm/yr
  - Palestine increase from 0% to 50% would yield 138mcm/yr
  - Both cases effluent total could meet 50% of agricultural water demand

Potential of this approach:

- Combined with Israel's excess production (on basis of regional transfers), TWW closes the 2030 regional deficit.
- Also reduces energy demand of new resource – 268mcm effluent @ 0.37twh vs 1.07 desal.
- Reduces pollution and environmental degradation
- BUT – for Jordan, final 20% difficult to develop, and also dependent on NRW reduction.
- Regardless of other developments, important resource to consider, especially if other resources delayed.

Conclusions: necessity for regional solutions

All proposed scenarios require a regional element:

Desalination will need regional infrastructure (especially Isr-Pal) and or regional water swaps (Red-Dead plan), or regional provision (ISR-JOR-UAE agreement 2021)

Treated wastewater will require regional best practice, transboundary infrastructure/water swaps, AND transboundary provision of desalinated water to make up remaining shortfall.

Additional water needed at regional scale even with all planned resources, and especially if planned developments are not achieved on schedule.

Further work

- Refinement of scenarios through spatially distributed infrastructure and water-energy linked models
- Better spatial interrogation of regional resources, including overlaps and double-counting between jurisdictions
- Balancing of least-regrets scalable investment at national level that can deliver enhanced regional water security, with or without close cooperation
- Use of Track II Diplomatic engagement to refine scenarios and build engagement and trust to progress regional solutions, first at national and then regional scale.

Thank you

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For further information about our project:

https://www.oxfordmartin.ox.ac.uk/transboundary-resource-management/