Conférence Parmenides IX – GID-CIHEAM – Bari – octobre 2021
Gestion durable des bassins versants méditerranéens face aux impacts des changements sociétaux et climatiques

Eran Friedler

Management sustainable Mediterranean watersheds in the face of the impacts of societal and climate change

Summary

The Mediterranean region suffers from water scarcity already today. Today's water scarcity is expected to rise due to the continual trends of population growth, increasing urbanisation and climate change effects. Natural water resources in the region are already exploited to their maximum, and in some cases even more. Thus, in order ensure water needs of people and agricultural activities (to ascertain food security) in the coming future, a new way of thinking towards sustainable use is much needed.

In my talk I will present several pathways of using alternative water sources as means to reduce potable water use, enhance water availability, and water use in a more sustainable way. I will concentrate on two main approaches: centralised and de-centralised (distribution)

1. Centralised approach – Collection of municipal wastewater through the sewer network, treatment in a wastewater treatment plant and reuse for agricultural irrigation or through a dedicated distribution system for non-potable uses in urban areas.

2. Decentralised (distributed) approach – Use of alternative water sources such as rainwater harvesting from roofs, greywater reuse, storm water harvesting. These can be implemented either on onsite or cluster scale.

By integrating both decentralised and centralised approached as appropriate depending on local conditions the benefits of both can be maximized in keeping people wellbeing while concurrently enhancing sustainability.

Groupe interacadémique pour le développement

GID- CIHEAM
Parmenides IX Conference

CIHEAM
Centre International de Hautes Études Agronomiques Méditerranéennes

Sustainable management of Mediterranean watersheds faced with the impacts of societal and climate changes

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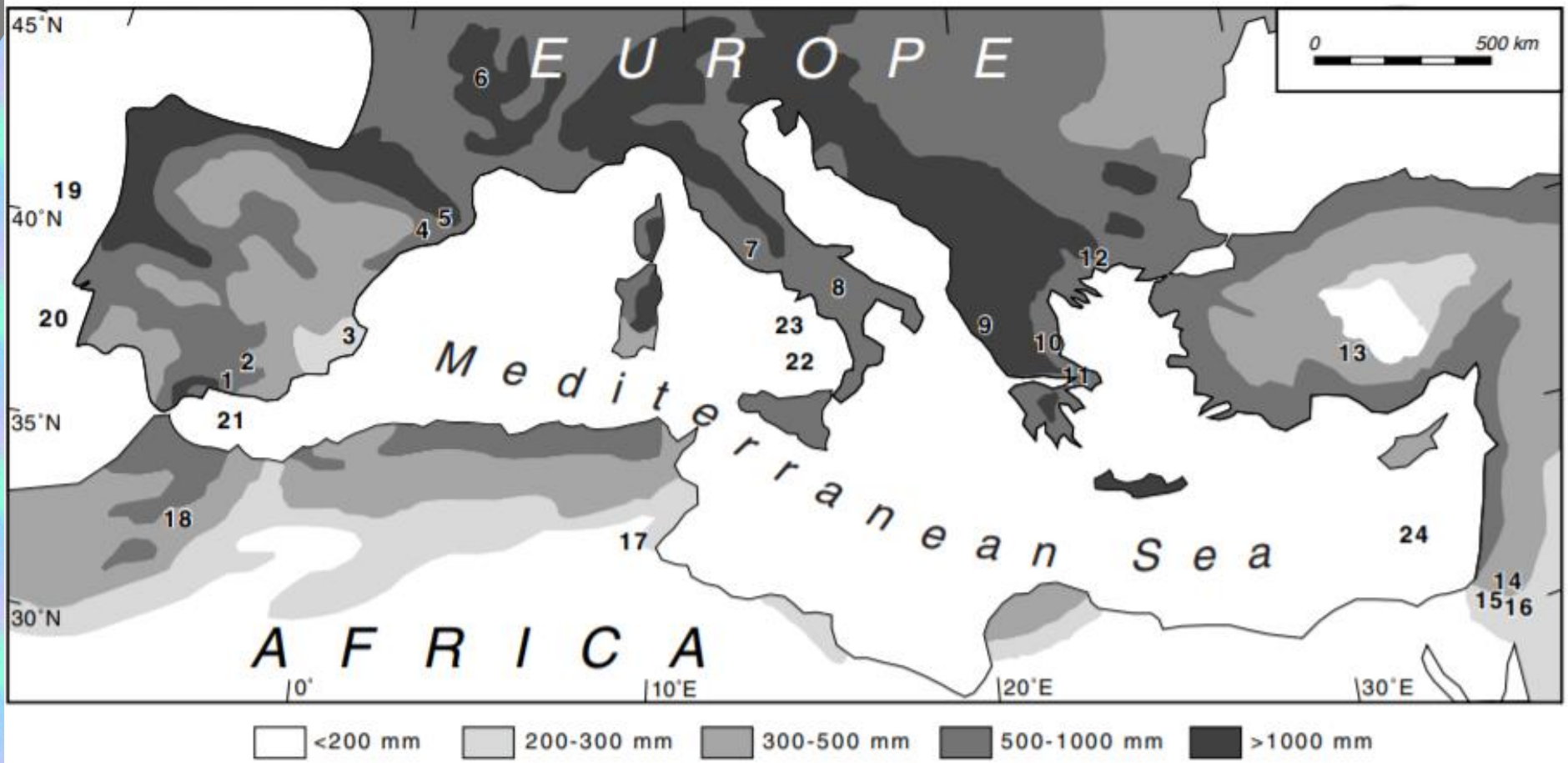
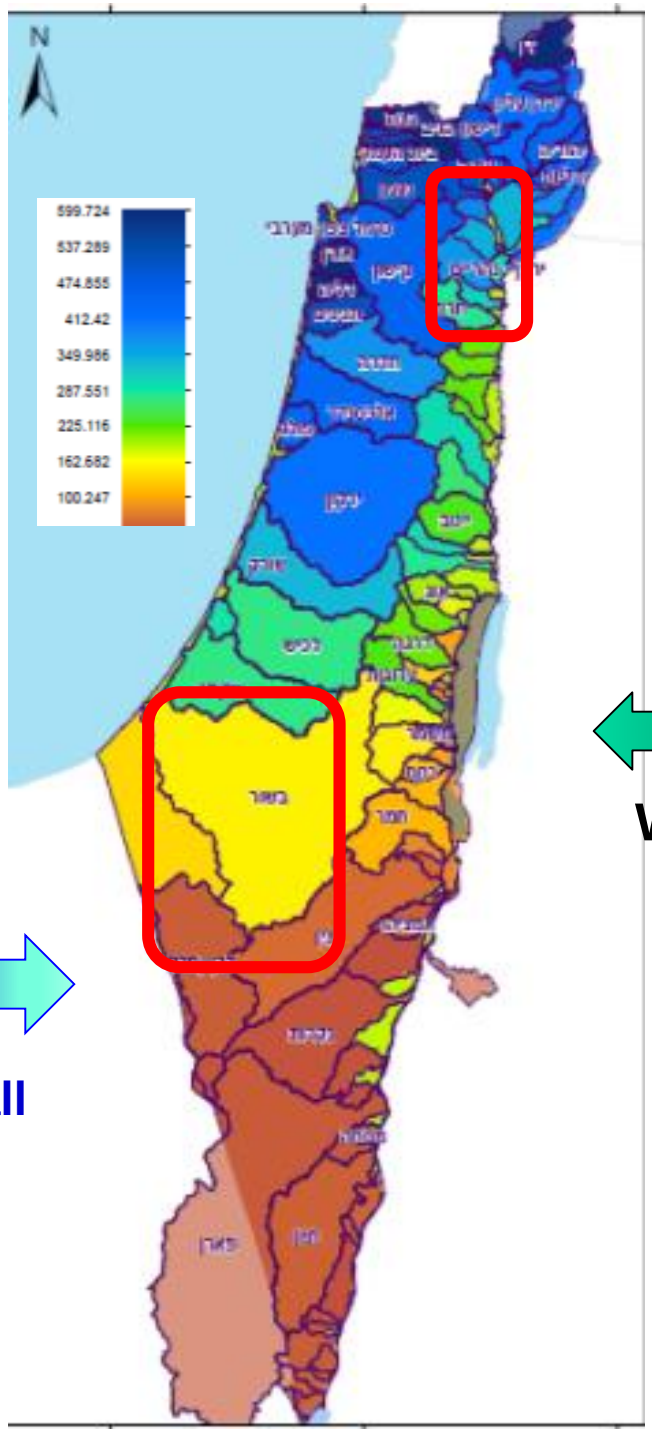


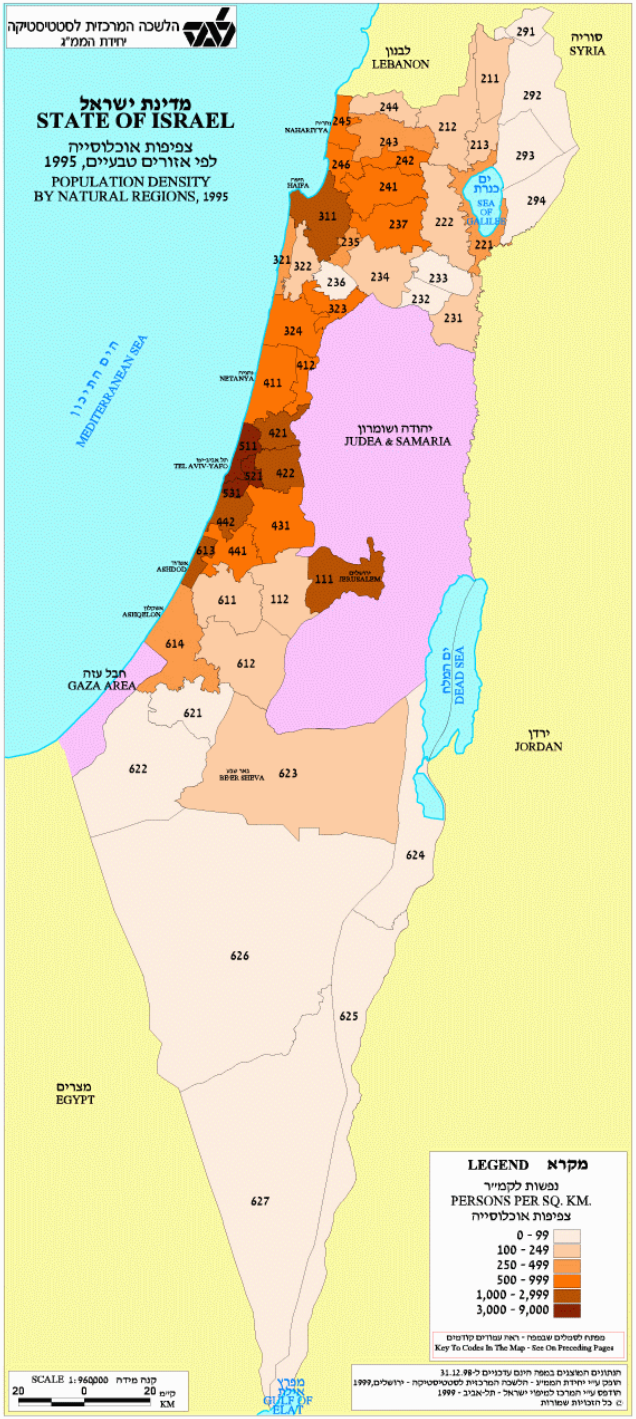
Mean annual precipitation around the Mediterranean basin (redrawn from Milliman et al. (1992))



Rainfall

Population

Watersheds

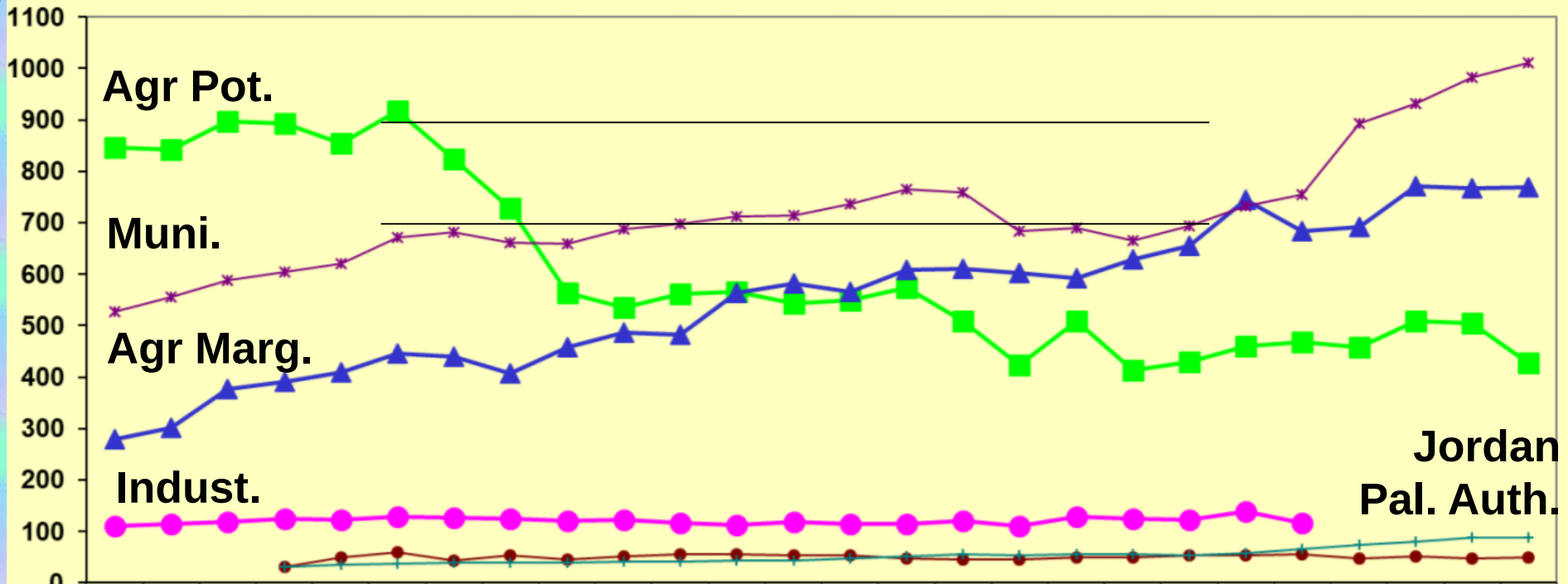


Timeline - Water Resources Development - IL

• 1930s	Local water enterprises, establishment of MEKOROT	
• 1932	Sea of Galilee dammed	Pre
• 1951-58	Hula valley drained	
• 1950-1970	Major drilling for groundwater	Blue
• 1955	Yarkon-Negev line (“66)	
• 1964	National water carrier (“108)	
• 1970’s	Treated wastewater reuse	Green
• 2000’s	Desalination	Indust

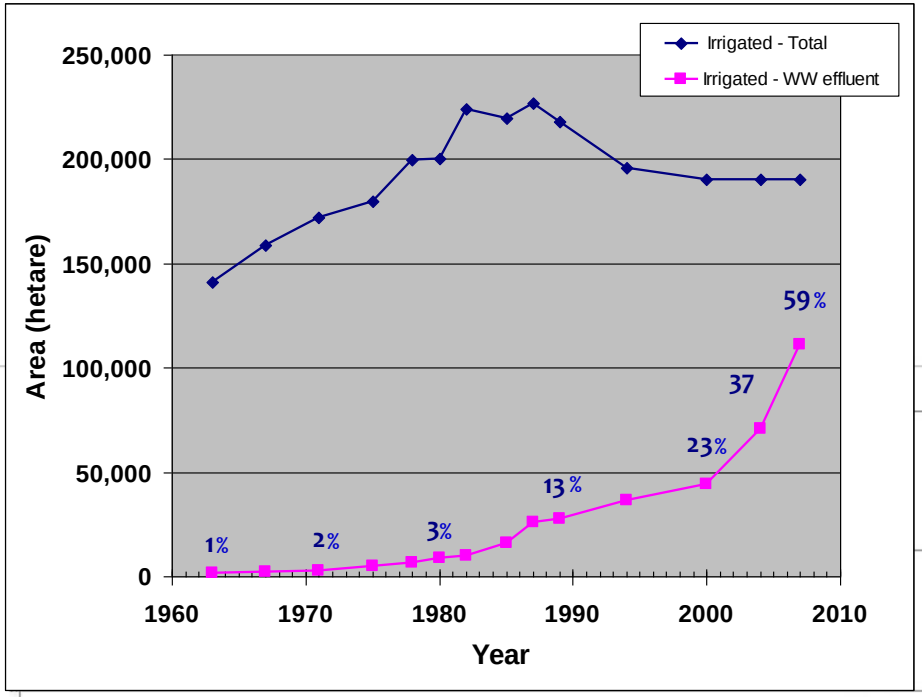
Water Demand by sector and type of Water (IL)

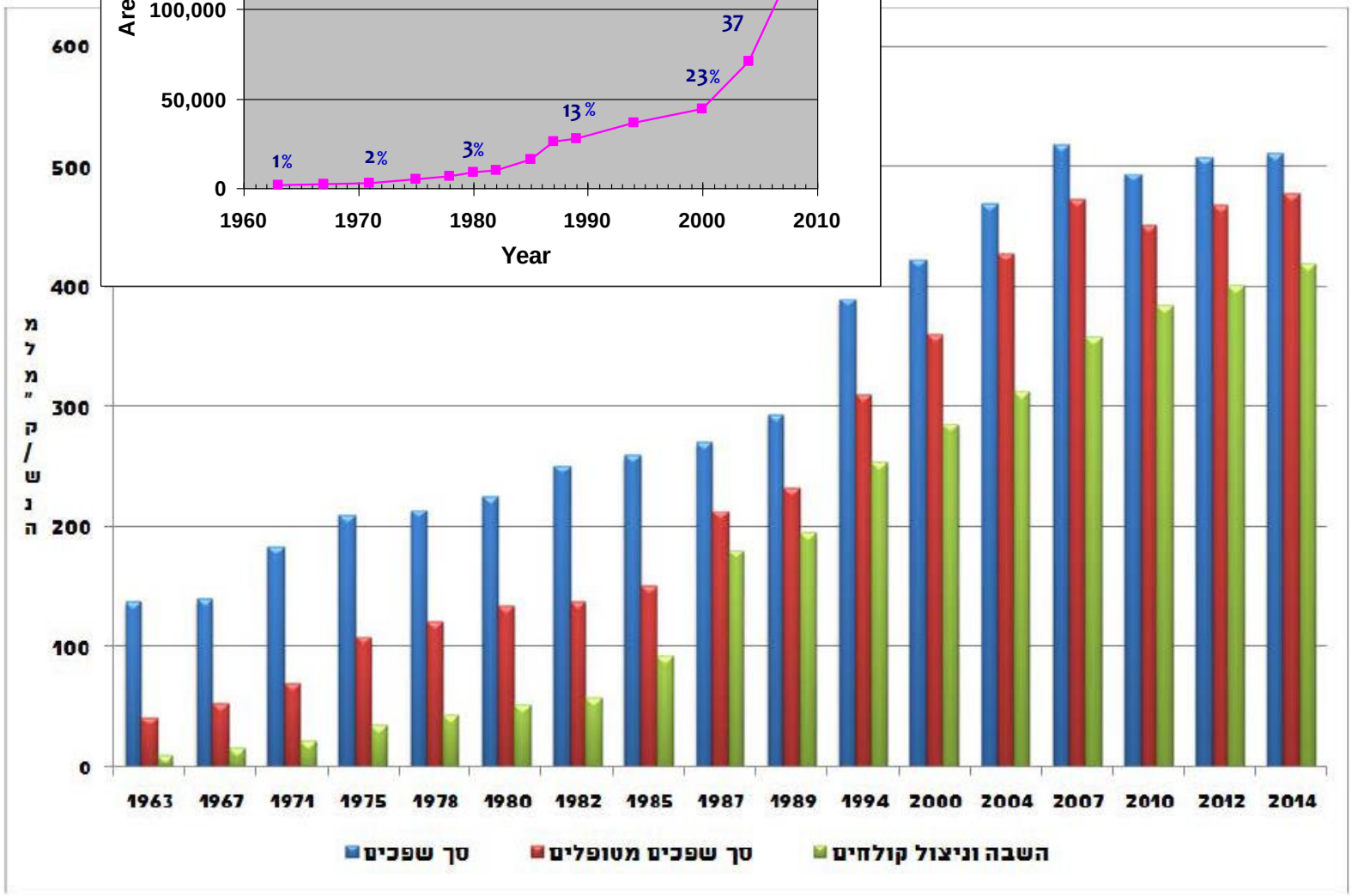
MCM/y



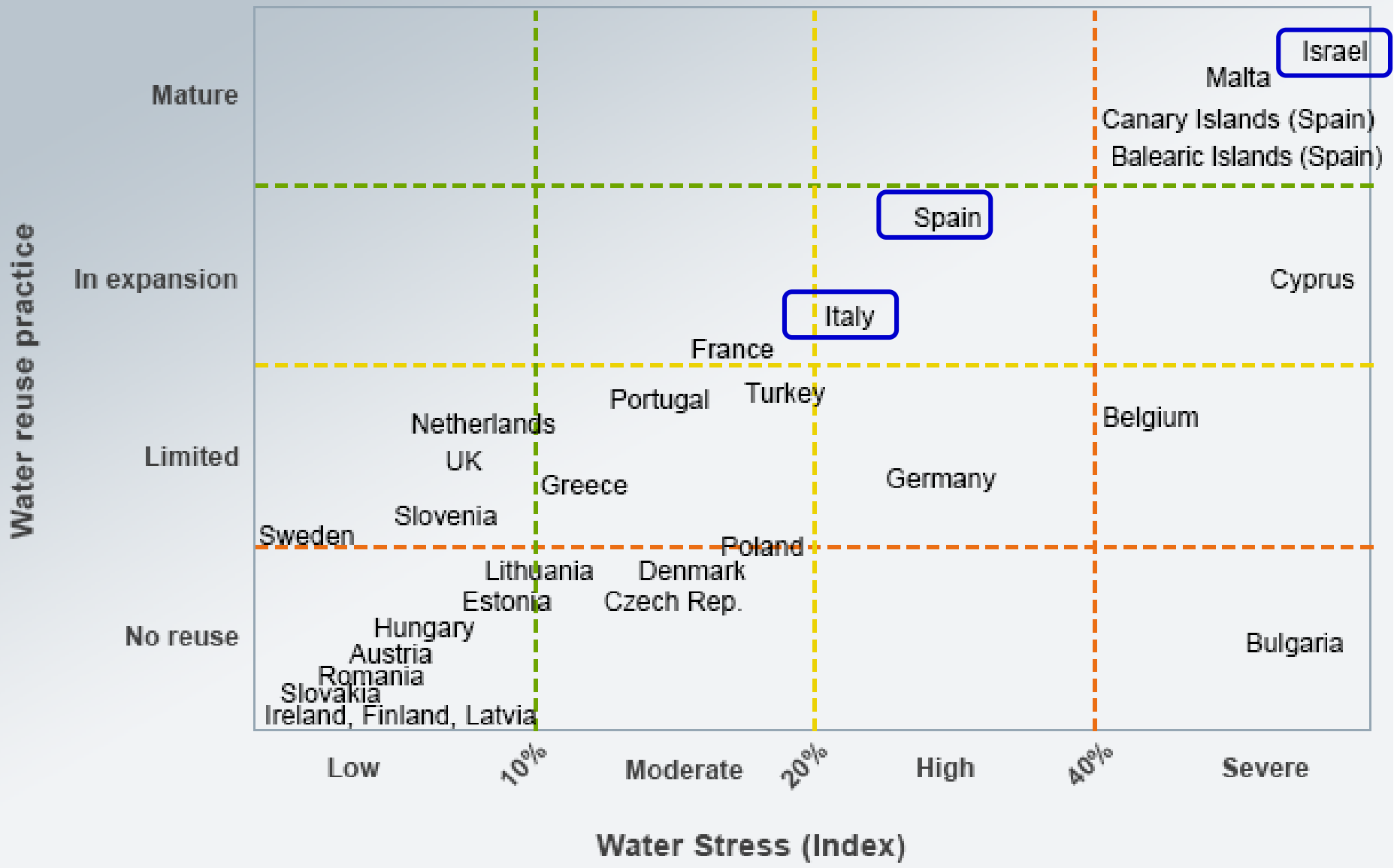
	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
	846	841	897	892	854	918	824	729	563	535	563	566	544	549	574	509	423	508	414	430	461	468	457	510	504	427
	279	302	376	392	410	447	440	408	459	486	483	564	583	567	609	612	602	592	628	656	744	683	692	772	767	768
צריכה ו	110	114	119	124	123	129	127	124	120	122	117	113	120	114	114	121	110	129.5	125	123	138	116				
	527	556	588	604	621	672	682	662	658	688	698	712	715	737	766	759	684	689	665	694	733	754	893	933	983	1011
				32	49	59	45	54	46	52	55	55	54	54	47	45	46	49	49	54	53	55	48	52	48	50
				31	35	37	40	40	39	42	41	44	44	48	51	55	54	55	55	54	58	66	74	79	87	89

Israel Water Authority (2019)


Irrigated - Total
Irrigated - WW effluent
250,000
200,000
150,000
100,000
50,000
0
Area (hetare)
1960
1970
1980
1990
2000
2010
Year
1%
2%
3%
13%
23%
37
59%


600
500
400
300
200
100
0
מלמ"ק/שנה
1963
1967
1971
1975
1978
1980
1982
1985
1987
1989
1994
2000
2004
2007
2010
2012
2014
סך שפכים
סך שפכים מטופלים
השבה וניצול קולחים

Water reuse practices versus water stress index



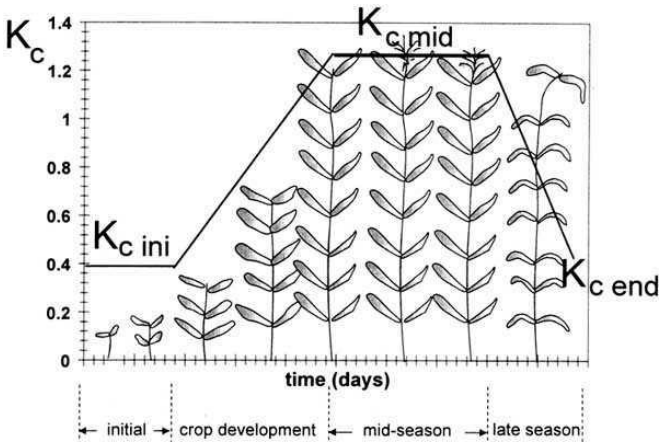
Source: Institute for Global Environmental Strategies, 2006

Water saving technologies - agriculture

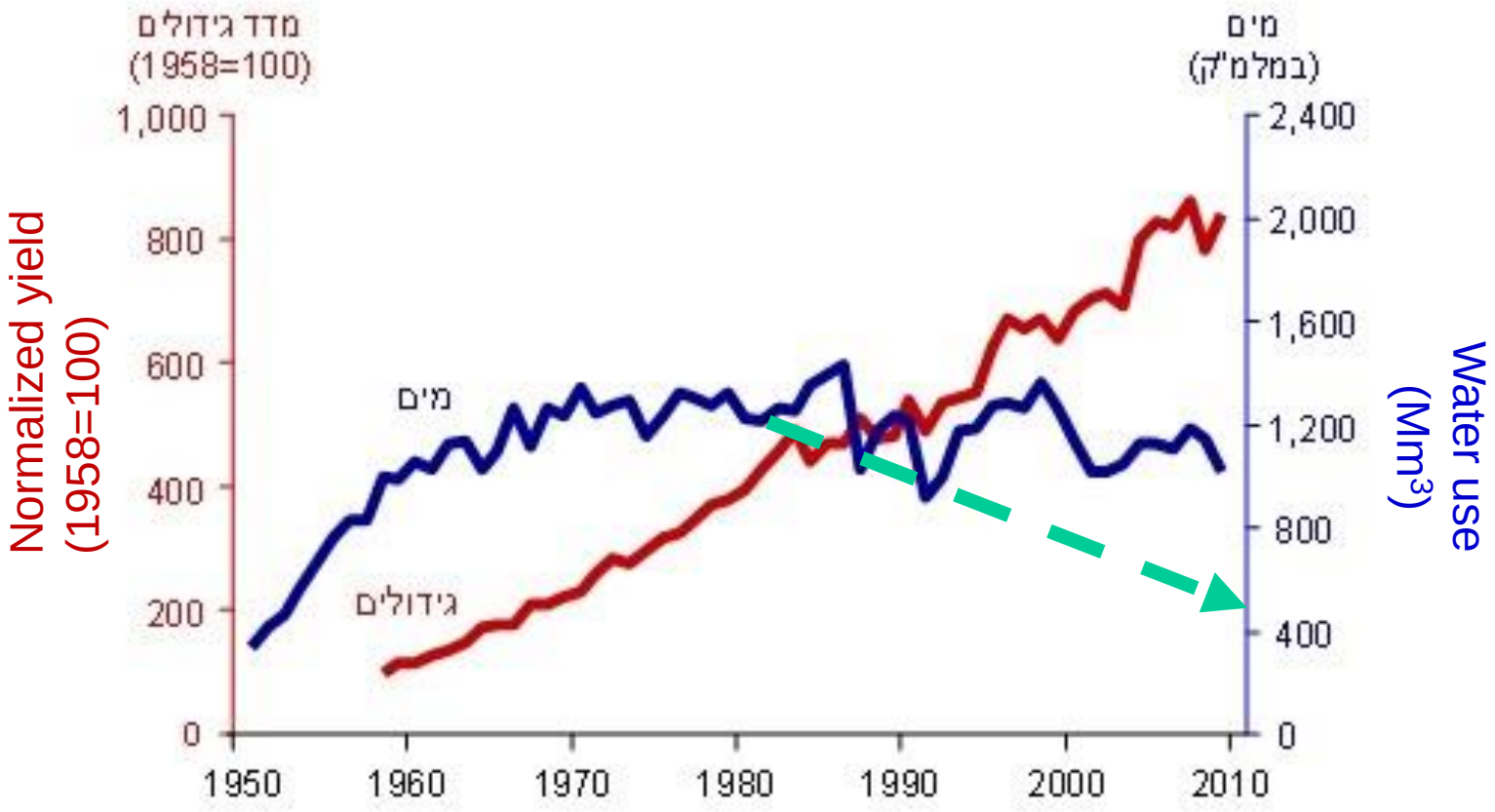
Precise irrigation and farming

Sensor based irrigation

Climate and cropping stage - based irrigation

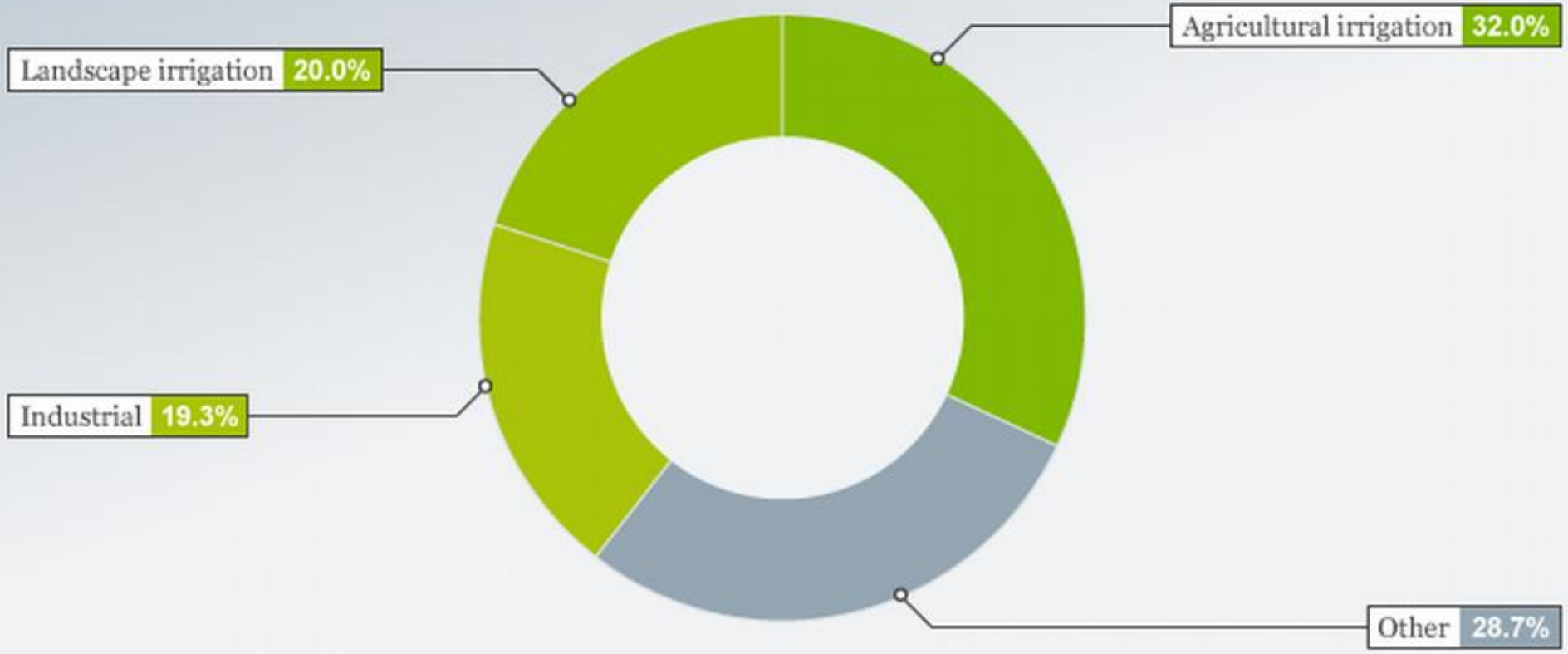


Agricultural Water use efficiency



Kislev, 2011

Market share of global water reuse after advanced treatment



Source: The United Nations World Water Development Report 2017

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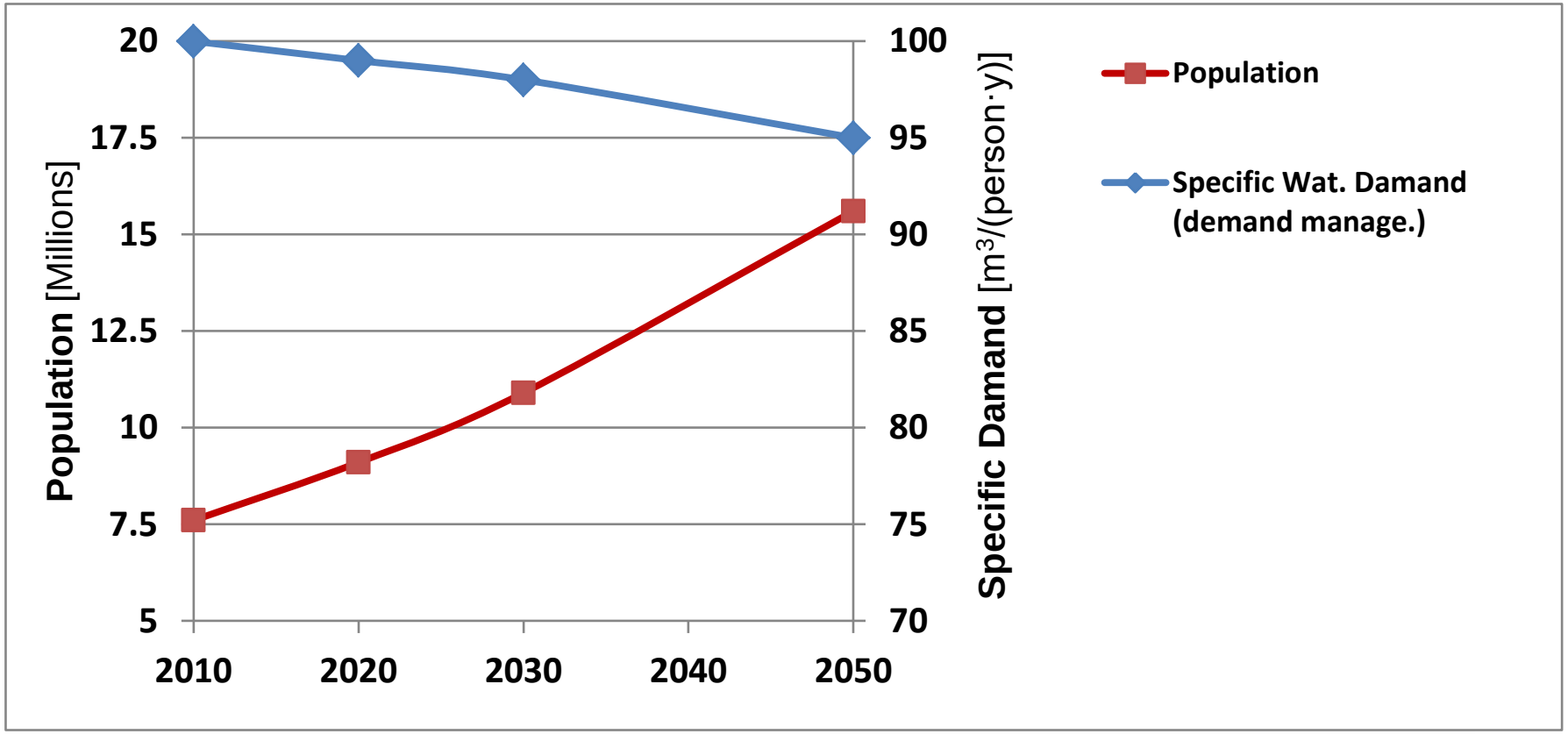
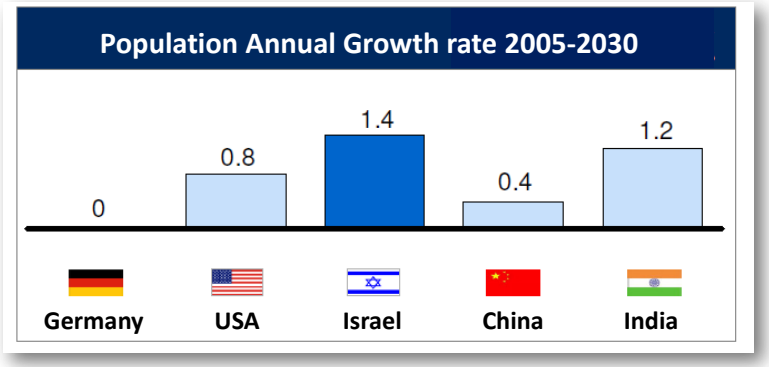
Population Growth & Water demand (IL)

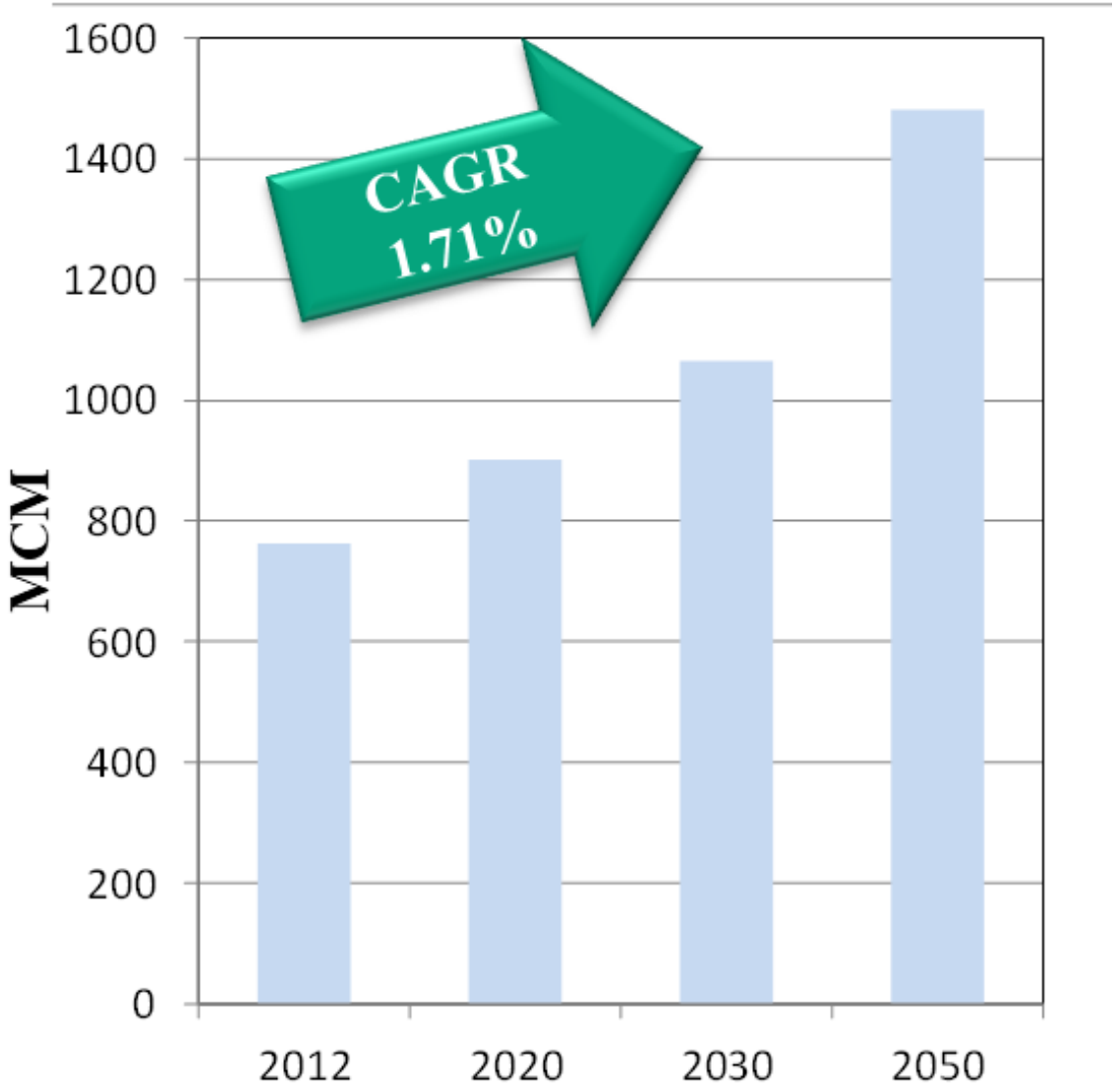


>90% live in cities

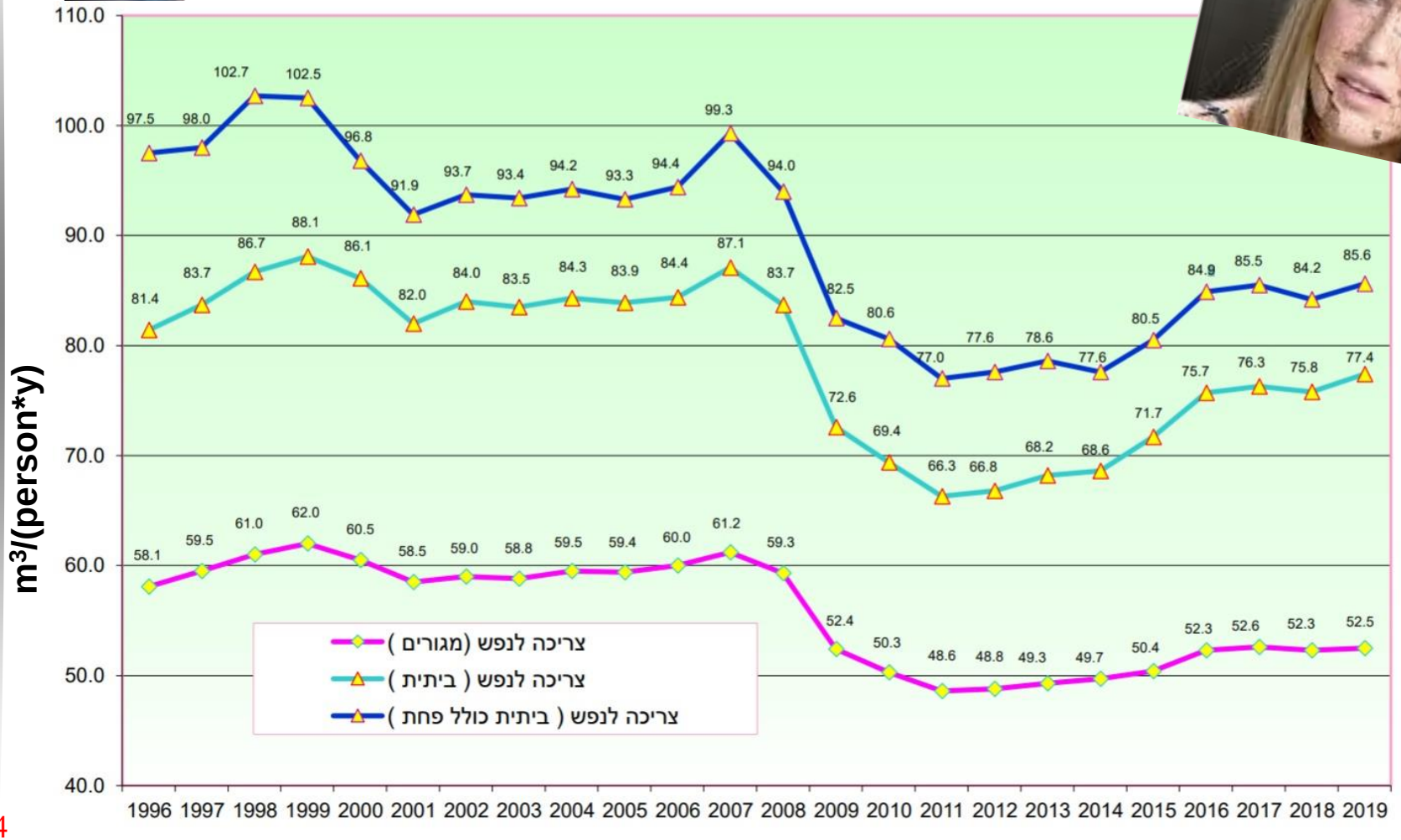
"City-sheds"



Growth of Municipal Water Demand (IL)



Municipal water demand 1996-2019 (IL)

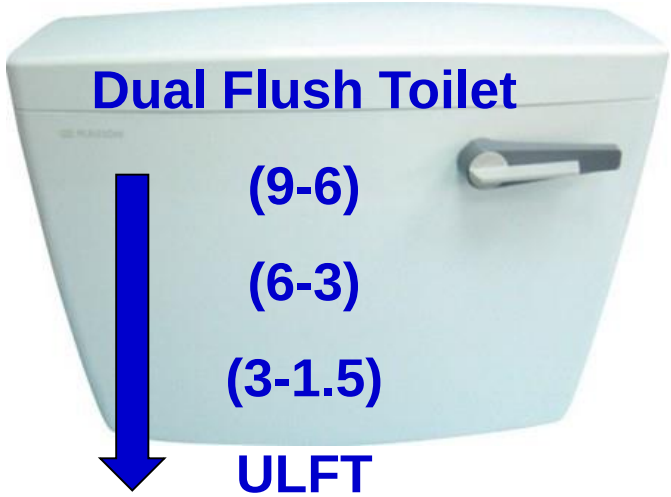


Israel Water Authority (2020)

Water saving technologies - household

Flow restrictors

Dual Flush Toilet



Washing Machines

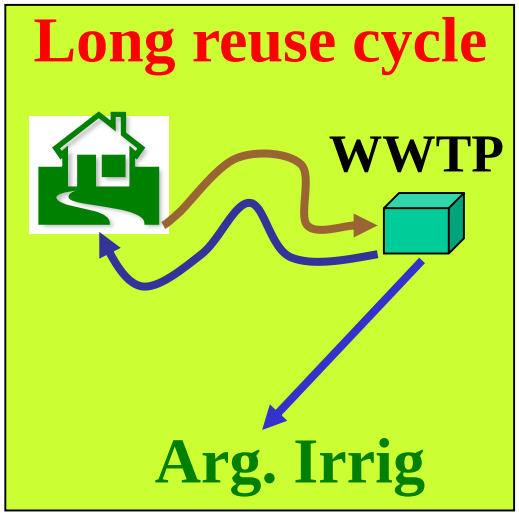
Dishwashers

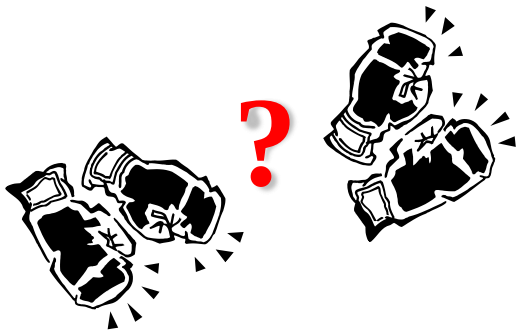
Urban WW reuse

Photo: Mr. Ehud Leshem

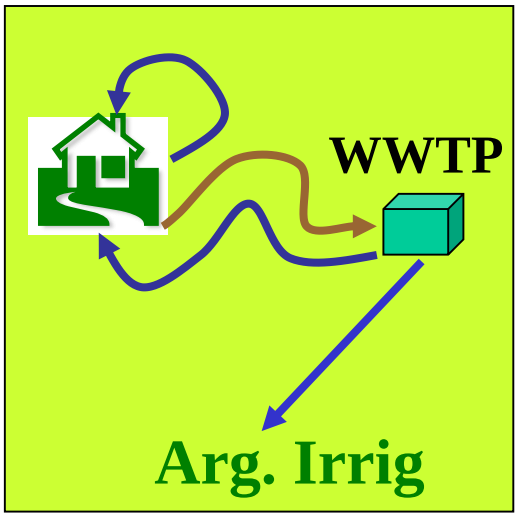
Water Reuse
Decentralised vs. Centralised

Centralised

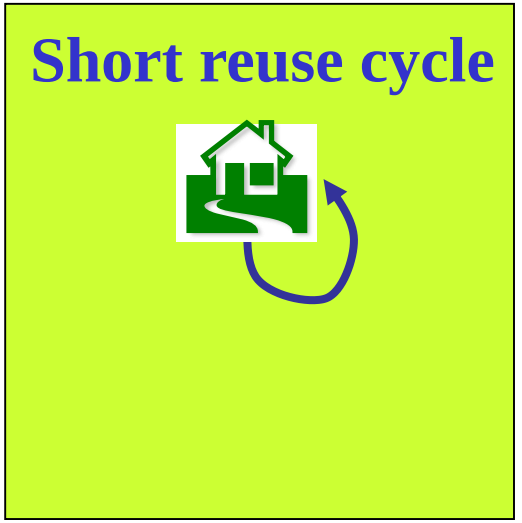




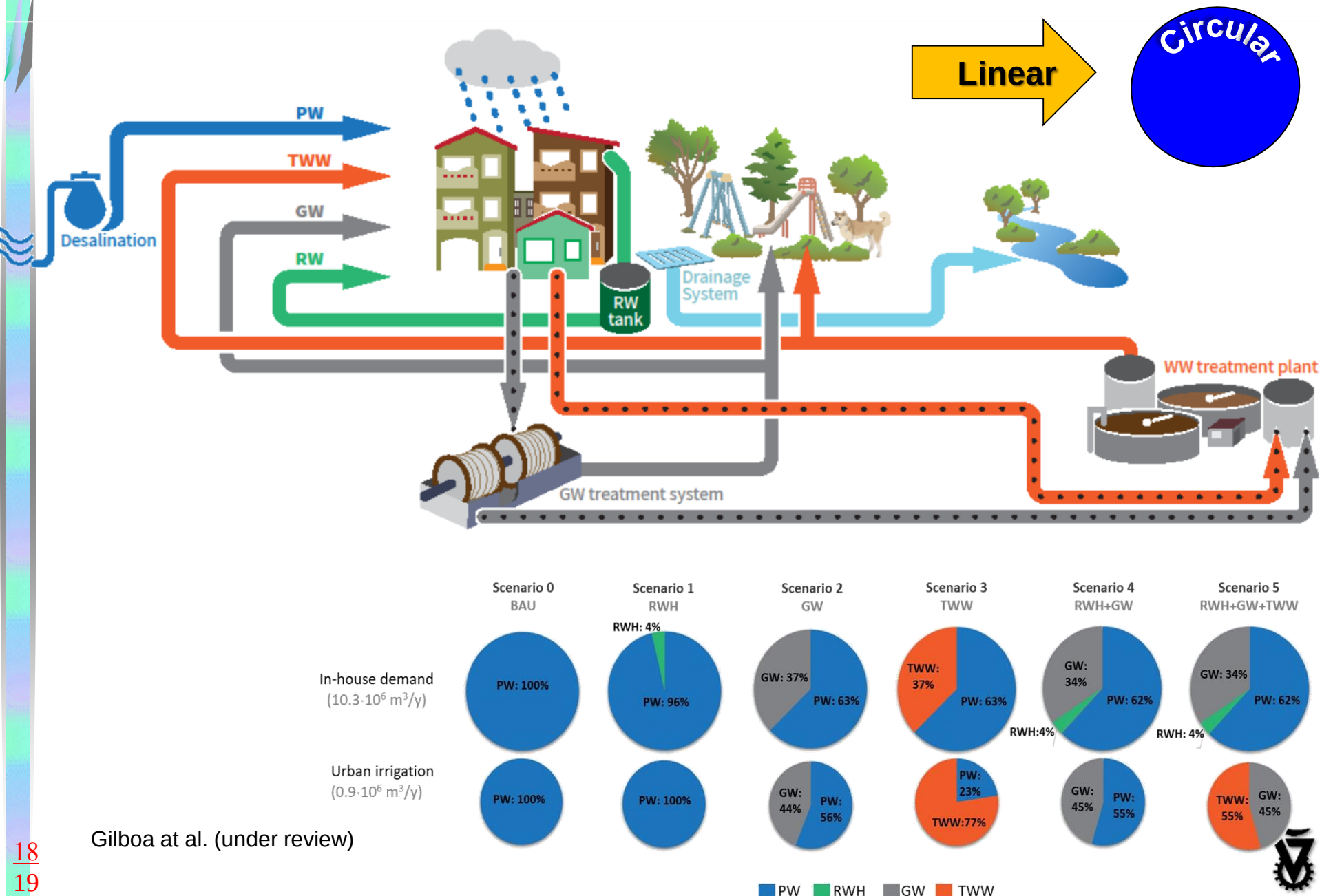
Combined



Decentralised



CLUWAL – Closing the Urban Water Loop



Gilboa at al. (under review)

Challenges & Solutions

- **Population growth & Urbanisation**
- **Climate change**
- **Wastewater reuse – Centralised approach**
  - Health & Environmental Risk assessment & management
  - Micropollutants of emerging concern (pharmaceuticals, PCPs, EDCs, ….)
  - Salinity
  - Conveyance from urban to rural areas
- **Desalination**
  - Energy consumption → Global warming, air pollution
  - Conveyance from seashore to cities
- **Alternative water sources (RWH, SWH, GWR) – Decentralised systems**
  - Operation, Maintenance, Management
  - Effects on existing urban infrastructure (mainly WW collection network, WWTPs)
  - Public acceptance / Water supply utilities
- **Water saving in the urban sector**
  - Public acceptance / Water supply utilities
  - Technology
  - Effects on existing infrastructure

Grazie per l'attenzione

Gracias por su atención

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