Adapting to Climate Change

Policy Frameworks for water scarcity

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Defining Droughts

Drought
The naturally occurring phenomenon that exists when precipitation has been significantly below normal recorded levels, causing serious hydrological imbalances that adversely affect land resource production systems.

Water Stress
Water stress occurs when the demand for water exceeds the available amount during a certain period or when poor quality restricts its use. Water stress causes deterioration of fresh water resources in terms of quantity (aquifer over-exploitation, dry rivers, etc.) and quality (eutrophication, organic matter pollution, saline intrusion, etc.).

Aridity
Aridity describes the long-term average dryness of a region, which leads to limited or low water content in the soil.

Source: European Environmental Agency, Glossary of Terms

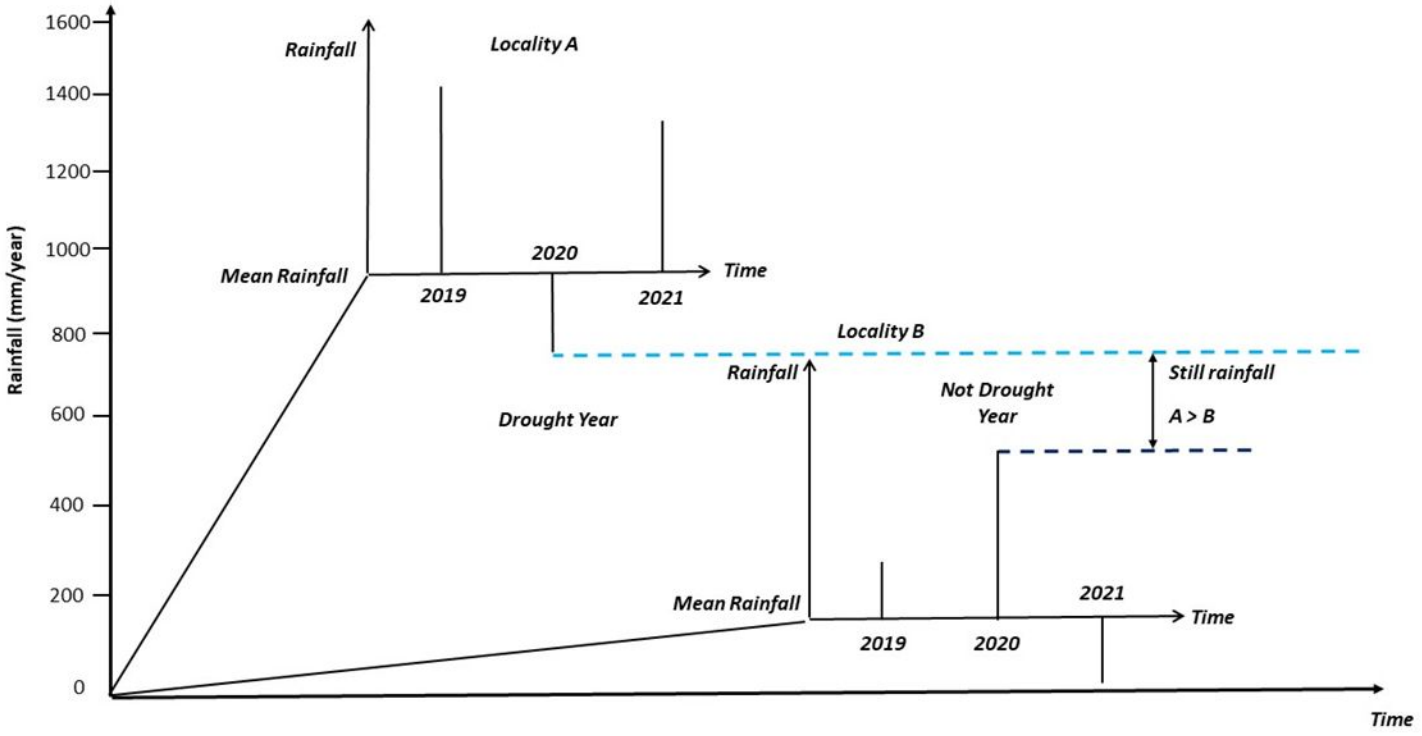
Relativity

However, from a water availability perspective Drought is relative.

A drought in a locality which has a high mean annual rainfall, could still entail a higher water availability than a locality which has a significantly lower mean annual rainfall.

Drought, on its own, does not necessarily imply water scarcity.

Mismanagement of water resources could also be a relevant factor for water scarcity.



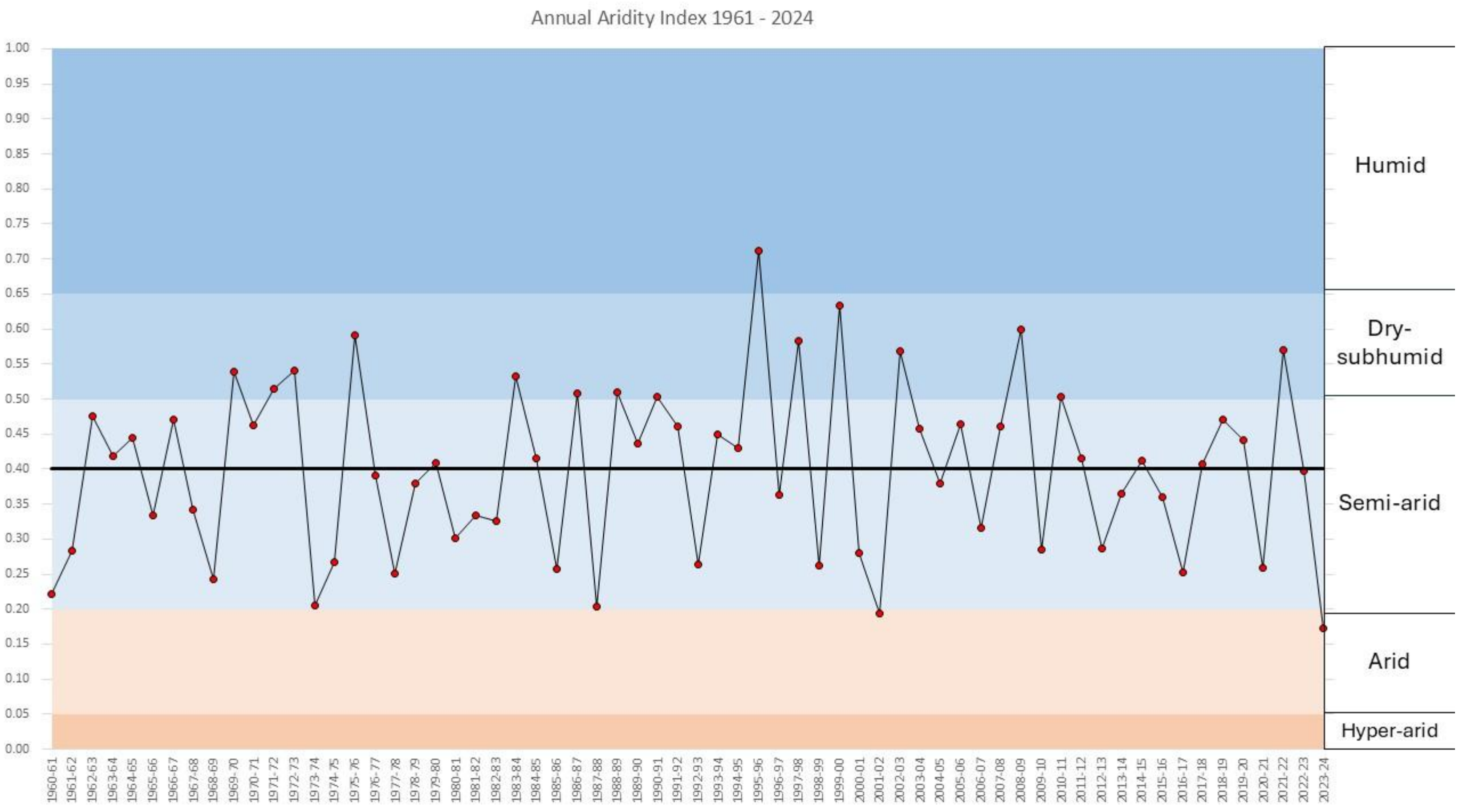
Aridity Index – UNEP (1992)

- Defined as the long-term average of annual precipitation to annual potential evapotranspiration ratio.

$$AI = \frac{P}{PET}$$

where:
PET is the potential evapotranspiration, and
P is the average annual precipitation.

State	Criterion
Humid	$AI \geq 0.65$
Dry - subhumid	$0.50 \leq AI < 0.65$
Semi-arid	$0.20 \leq AI < 0.50$
Arid	$0.05 \leq AI < 0.20$
Hyper-arid	$AI < 0.05$



Malta – Annual Aridity Index 1960 - 2024

Rainfall Distribution

Looking at Malta:

Over the past 16 years, from 2008 to 2024, 12 of these years experienced annual precipitation levels below the long-term average (average rainfall from 1940 till 2024).

The months that most consistently recorded below-average rainfall were December, January, and April.

The average annual rainfall throughout this period is of 458mm, indicating a 17% reduction in rainfall in recent years when compared to the long-term average rainfall from 1940 till 2024.

	Average Rainfall												
Hydrological Years	Sep	Oct	Nov	Dec	Jan	Feb	Mar	April	May	June	July	Aug	Annual
2008-2009	62.5	63.4	84.9	87.6	208.4	94.1	32.1	38.4	2.1	1.6	0.2	4.2	679.5
2009-2010	69.9	58.2	35.6	53.8	63.1	18.1	63.2	2.5	12.1	1.7	0.3	0.1	378.6
2010-2011	76.0	228.9	14.6	29.3	80.4	121.9	33.7	20.4	8.5	4.8	0.5	0.2	619.0
2011-2012	8.9	74.7	189.4	71.7	76.3	112.1	85.0	16.9	0.7	0.4	0.1	0.5	636.6
2012-2013	86.6	62.7	93.3	41.1	52.3	54.0	19.7	20.5	1.8	0.6	0.3	9.3	442.1
2013-2014	38.1	21.8	173.5	84.4	58.6	64.0	45.7	11.2	4.5	2.3	0.3	0.7	505.0
2014-2015	0.9	68.2	79.8	142.5	66.1	125.1	58.5	3.8	16.7	0.8	0.7	15.3	578.3
2015-2016	20.5	73.5	39.2	36.8	19.5	2.0	18.0	2.0	8.3	16.9	0.2	4.0	241.0
2016-2017	30.8	33.8	85.2	71.2	65.3	53.5	15.8	7.8	0.4	4.3	0.1	2.4	370.5
2017-2018	48.5	78.6	65.8	37.3	10.5	123.7	33.9	1.6	4.0	5.7	0.1	26.8	436.4
2018-2019	13.6	169.1	71.1	29.0	78.8	64.9	41.7	19.2	16.7	0.2	1.5	0.3	506.0
2019-2020	43.1	86.0	124.2	40.9	10.0	0.3	37.3	9.4	12.5	0.1	2.8	0.1	366.5
2020-2021	98.3	32.0	66.3	67.0	64.7	4.2	21.7	1.4	0.2	0.5	0.0	0.3	356.4
2021-2022	18.3	191.7	166.1	37.1	51.0	4.3	15.7	1.5	11.4	0.0	0.6	13.9	511.4
2022-2023	58.1	18.1	153.1	7.5	58.6	128.3	5.1	25.4	20.9	4.4	0.0	9.1	488.6
2023-2024	18.9	0.4	57.4	39.8	36.0	37.5	6.5	9.3	7.5	2.3	0.0	4.9	220.3

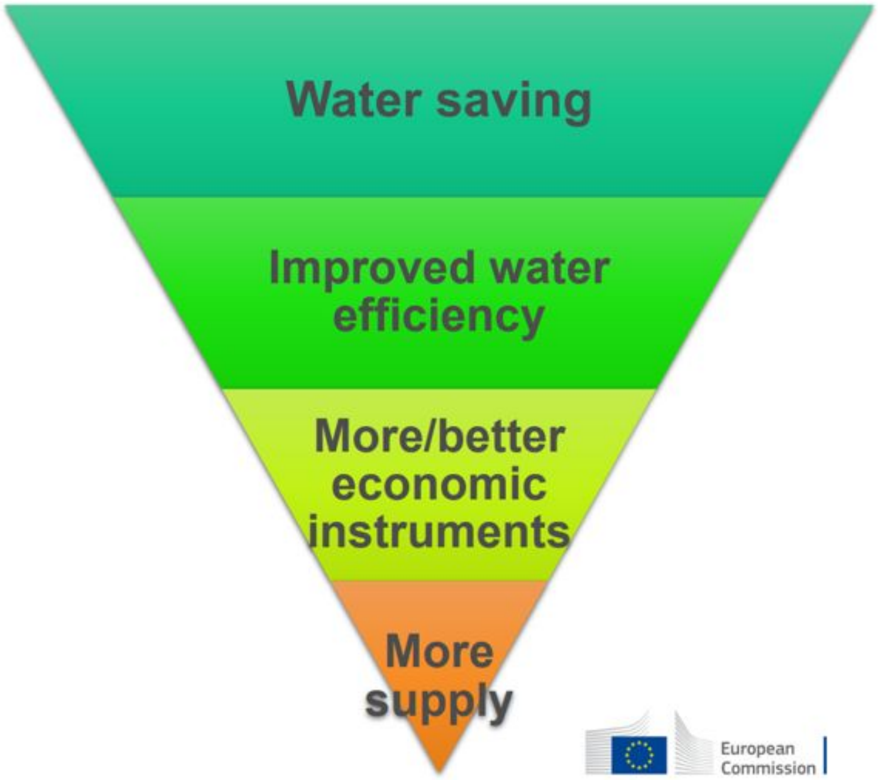
Efficiency First

EU Water Policy focuses on the promotion of Water Demand Management Applications.

The EU Water Hierarchy promotes the "Water Efficiency First Principle" entailing that Water Demand Management Measures need to be prioritised over Water Supply Augmentation Measures.

In a context of chronic Water Scarcity (insufficient availability of natural freshwater resources) this approach simply fails to ensure water supply security.

Reducing water demand below specific thresholds is not physically feasible or disproportionately expensive. What happens if sufficient natural water resources are not available to meet (an efficient) demand?

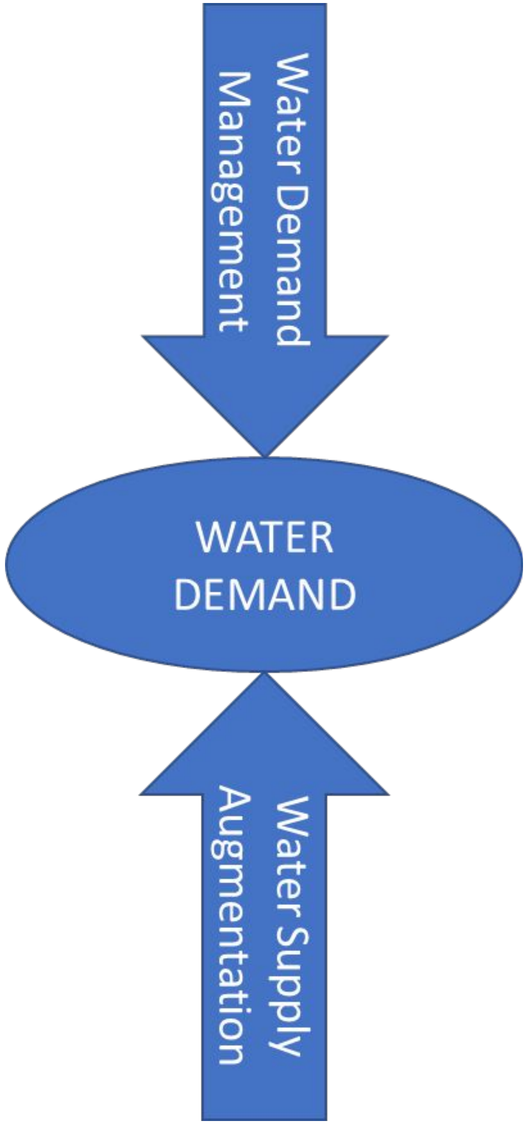


Policy Approach

Under conditions of water unavailability, development of a water management framework needs to starts with acknowledging reality.

Even if water demands are kept at highly efficient levels, there is insufficient natural freshwater resources to sustainably meet national demand.

As an example, Malta’s water management framework is based on a two-pronged strategy to achieve water security: meeting water demand through the conjunctive use of water supply augmentation and water demand management measures, in an increasingly sustainable manner.



WEFE Nexus

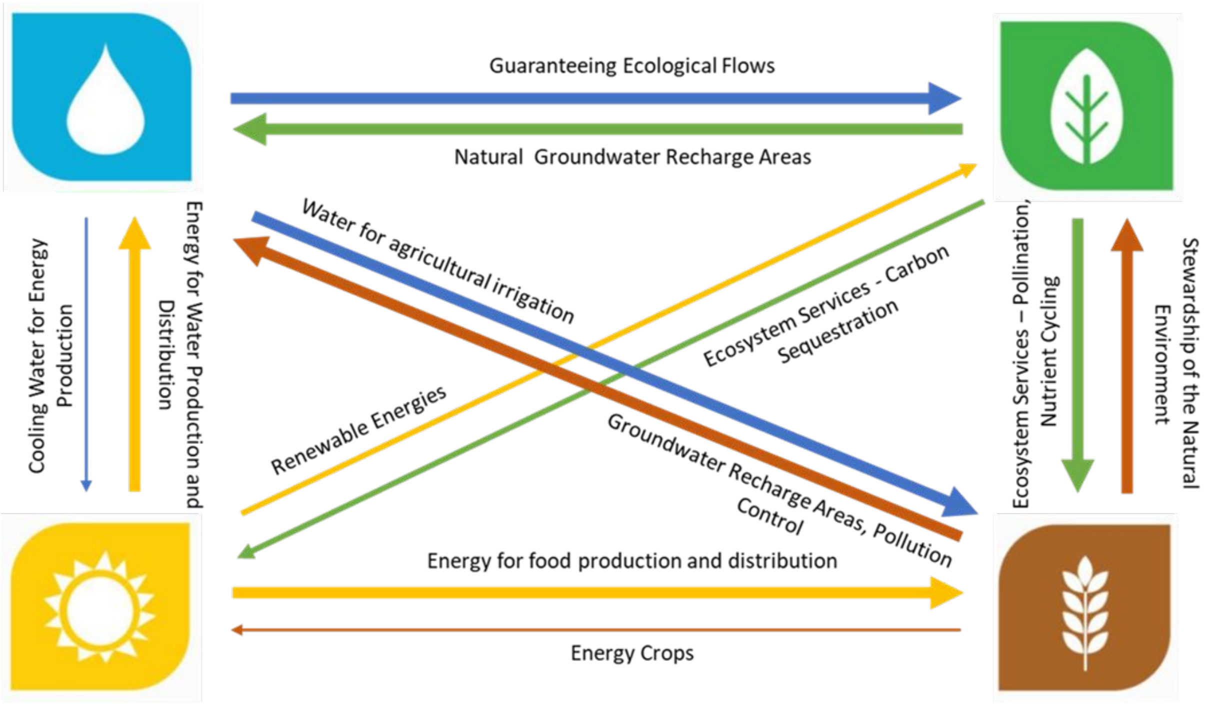
The WEFE Nexus provides an opportunity for developing comprehensive water policies.

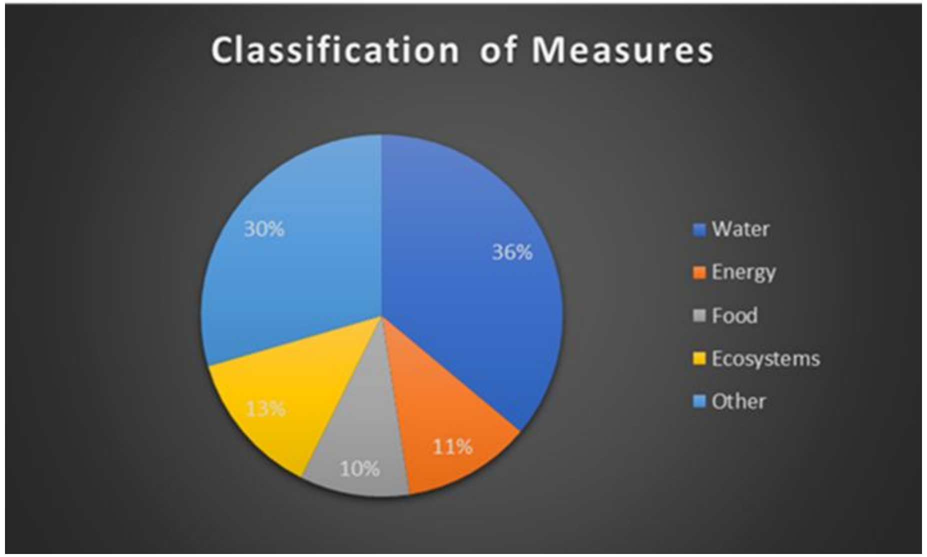
In a context of water scarcity issues such as:

- Energy Use for Water Production
- Ensuring water availability for agriculture and nature (ecological flows)
- Efficiency in Water Use
- Sustaining natural groundwater recharge areas

start to gain increased importance, and hence water policies need to adapt to these new conditions.

Cohesive water management frameworks are increasingly required to ensure that our response to water scarcity is cross-sectoral and sustainable.





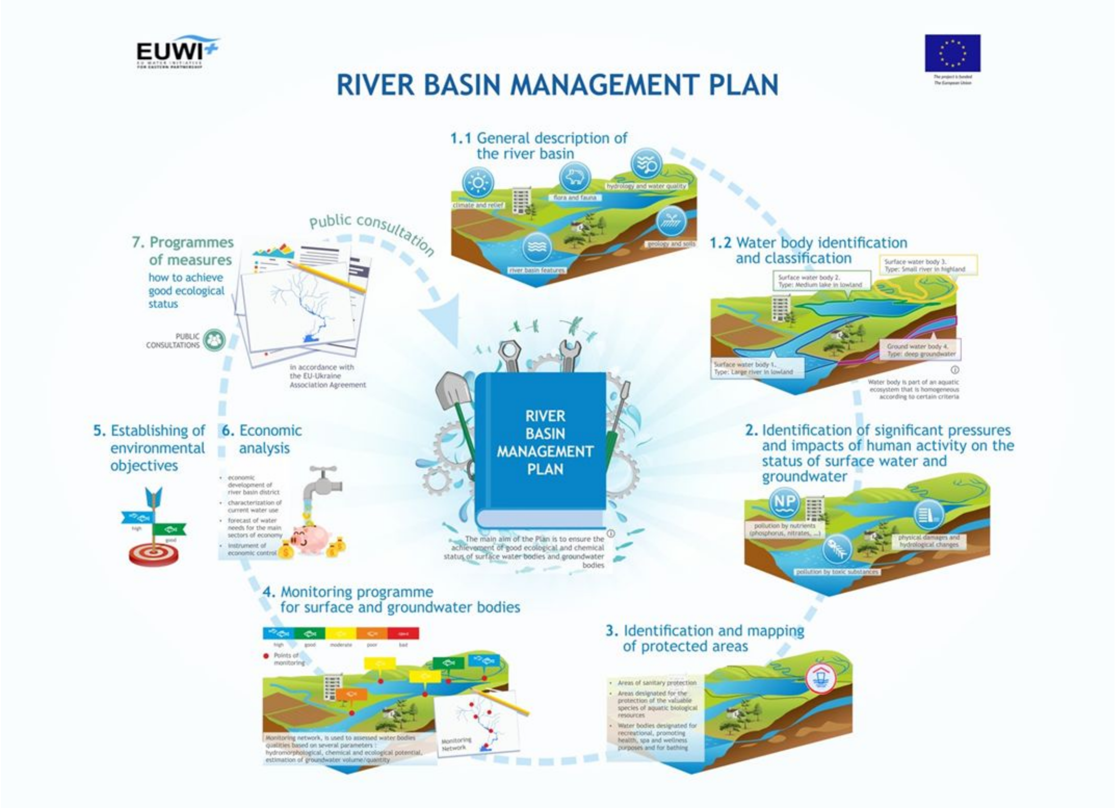
RBMPs

RBMPs are not just about the water environment.

Require links to:

- Effective stakeholder engagement,
- Economic Analysis of water use,
- Ecosystem Protection,
- Energy Efficiency,
- Climate Change,
- Water use by agriculture and other economic sectors, and
- Research and Development.

Can provide an opportunity for the application of the WEFE Nexus context to optimise water management at the river basin scale and effectively address water scarcity in a sustainable manner.



Conclusion

Water Resilience is not just about water!!

Given its horizontal nature water availability affects other sectors.

An assessment of Malta’s 3rd RBMP shows that while it strongly addresses SDG6 it also contributes to the achievement of the objectives under 14 other SDGs.

Adapting to drought, and addressing water scarcity requires comprehensive policies which ensure broad and cross-sectoral sustainability.

Thank-you for your attention

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