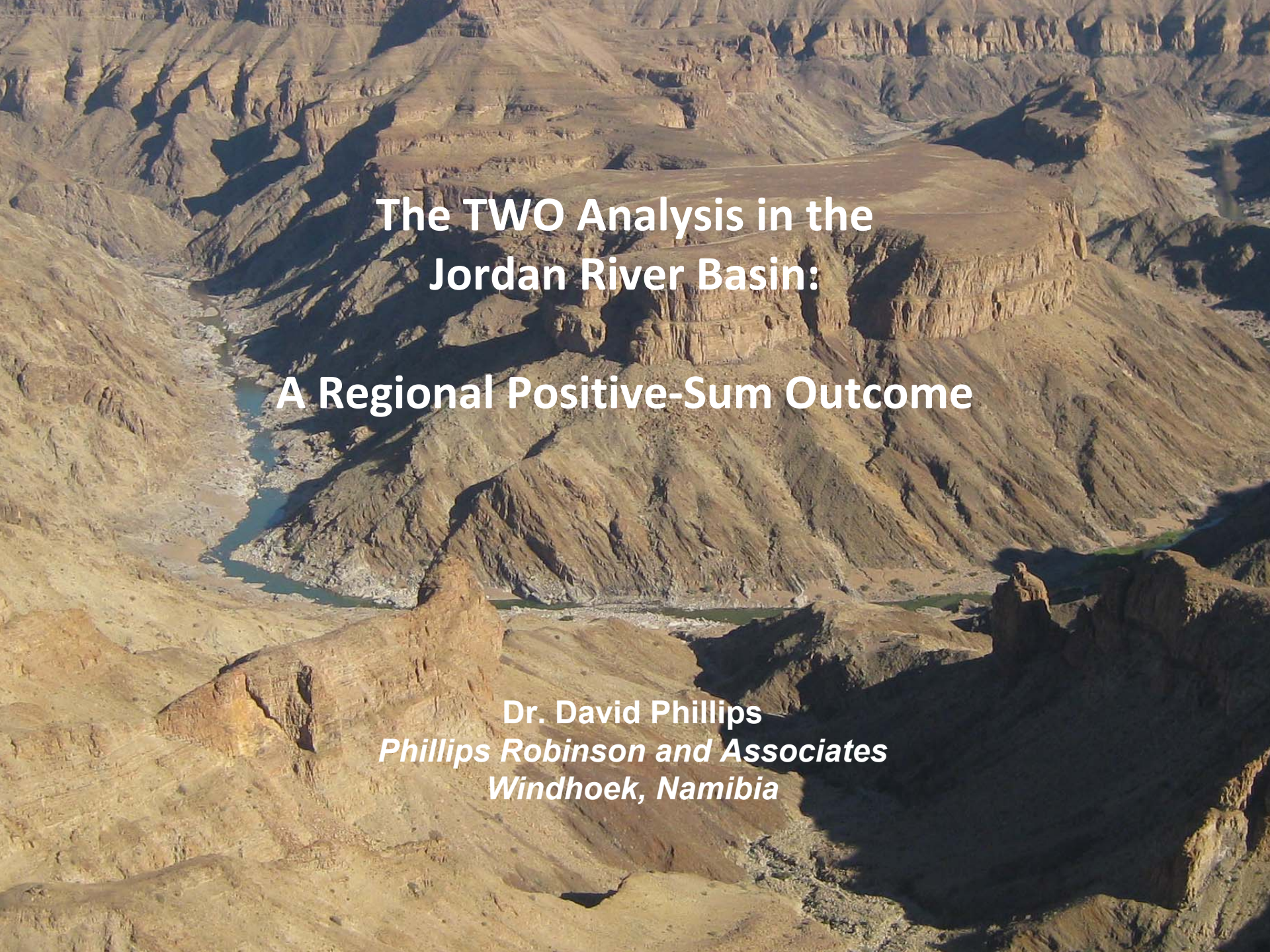

The TWO Analysis in the Jordan River Basin:

A Regional Positive-Sum Outcome

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Coverage of the Presentation

- The problem in the Jordan River basin
- The proposed Positive-Sum Outcome
- Using the TWO Analysis to enhance basin-wide benefits
- Conclusions

[Coverage of the Presentation]

- **The problem in the Jordan River basin**
- **The proposed Positive-Sum Outcome**
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- **Conclusions**

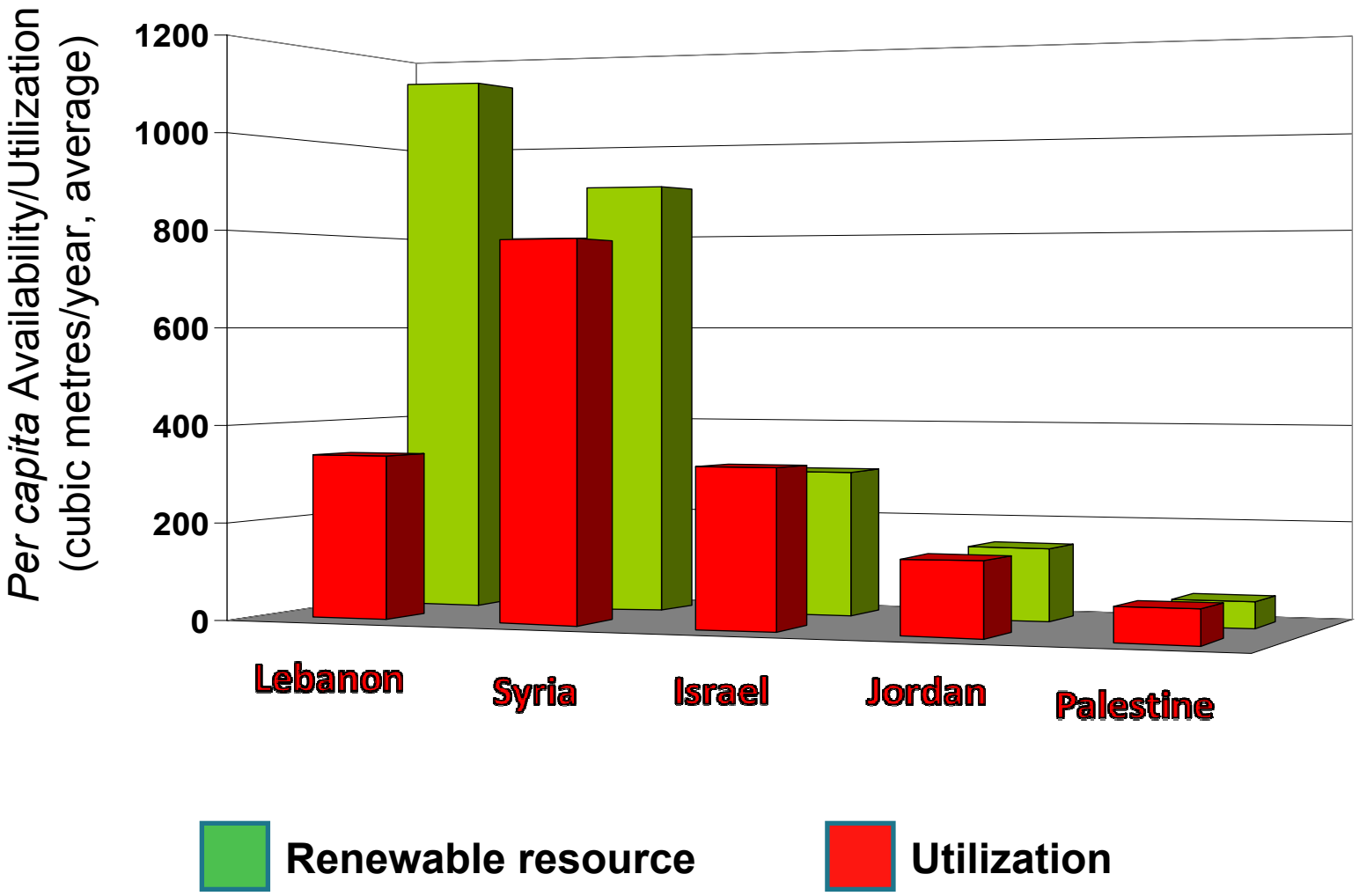
The Jordan River Basin: Overview

- Five co-riparians exist in the Jordan River Basin (JRB).
- Palestine and Israel share four aquifers and two major surface waters (the Jordan River and Wadi Gaza).
- The riparians have always competed for the available water resources, and continue to do this.

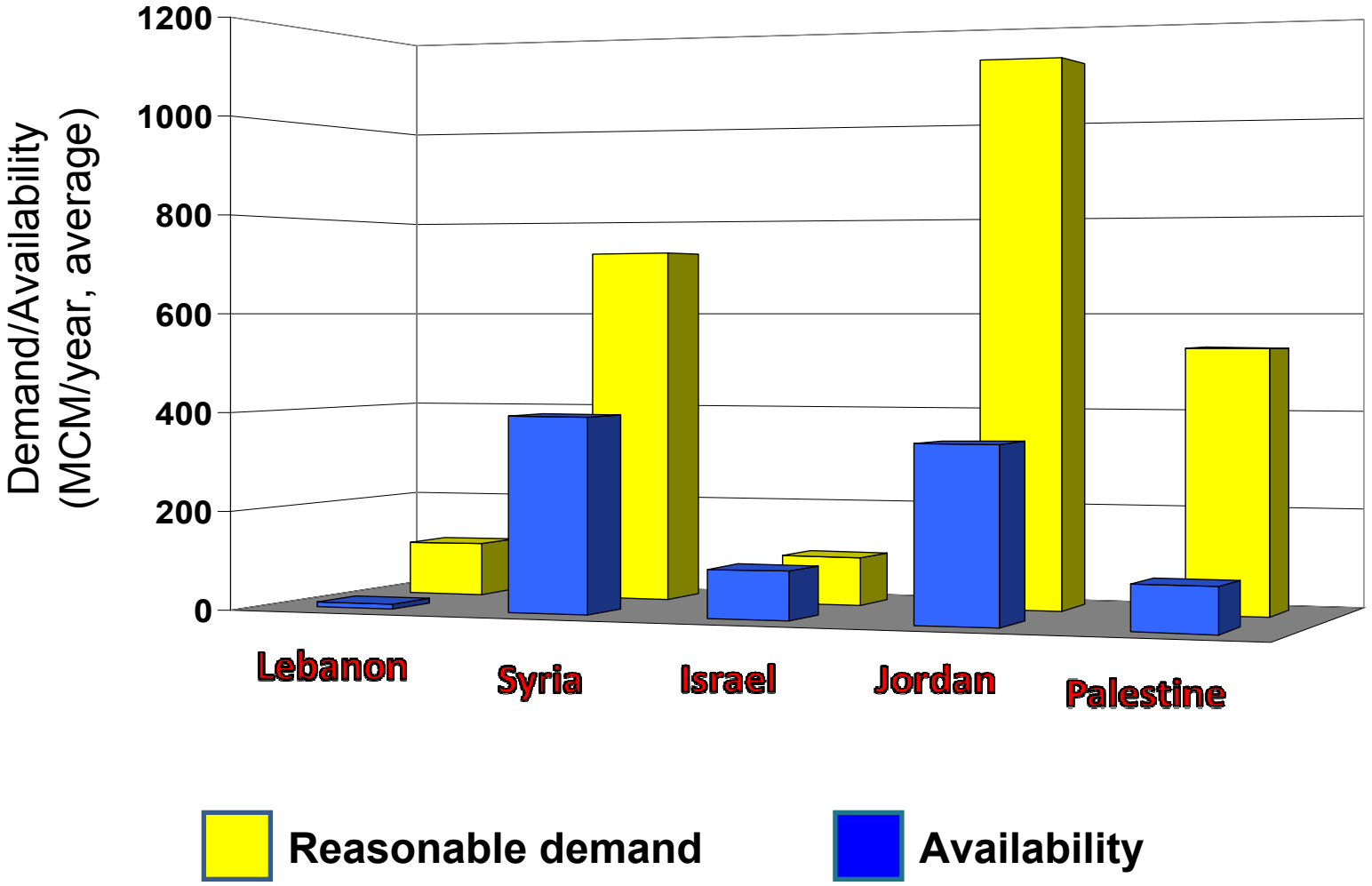
The Key Problems in the JRB

- Deeply inequitable allocations of fresh water between the five riparians.
- Considerable distrust between the riparians; ongoing political and sometimes military hostility.
- Historical agreements of questionable quality and/or equitability; no basin-wide agreement.
- Shortages of water within the basin, for all riparians other than Israel.
- Little or no interest to date, in optimising or sharing the basin-wide benefits.

Present *Per Capita* Renewable Fresh Water and Utilization, Country-wide



Reasonable Total Water Demand and Availability, Within the Basin

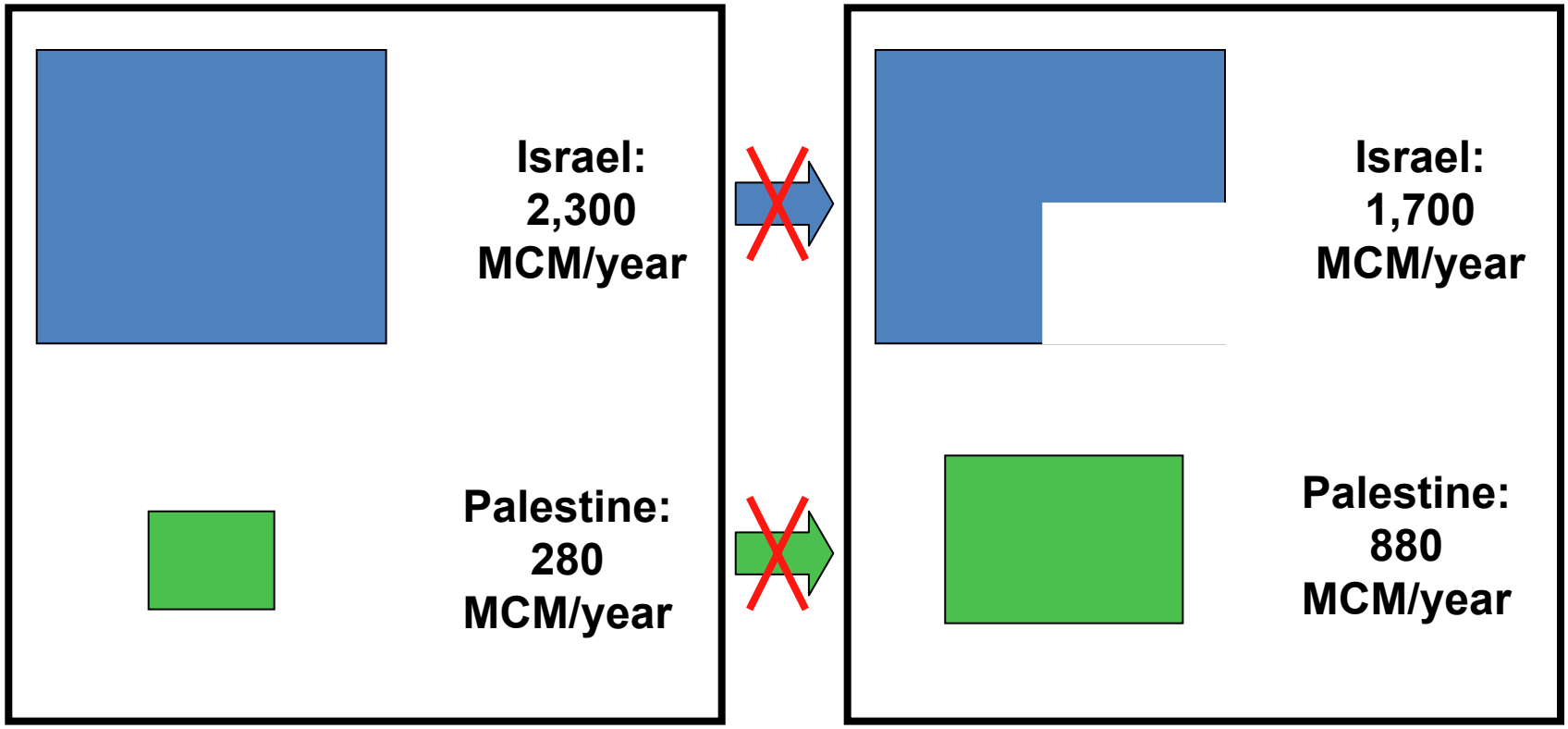


Demand Management

- **The existing problems cannot be solved by demand management, as the inequities between the riparians are too great.**

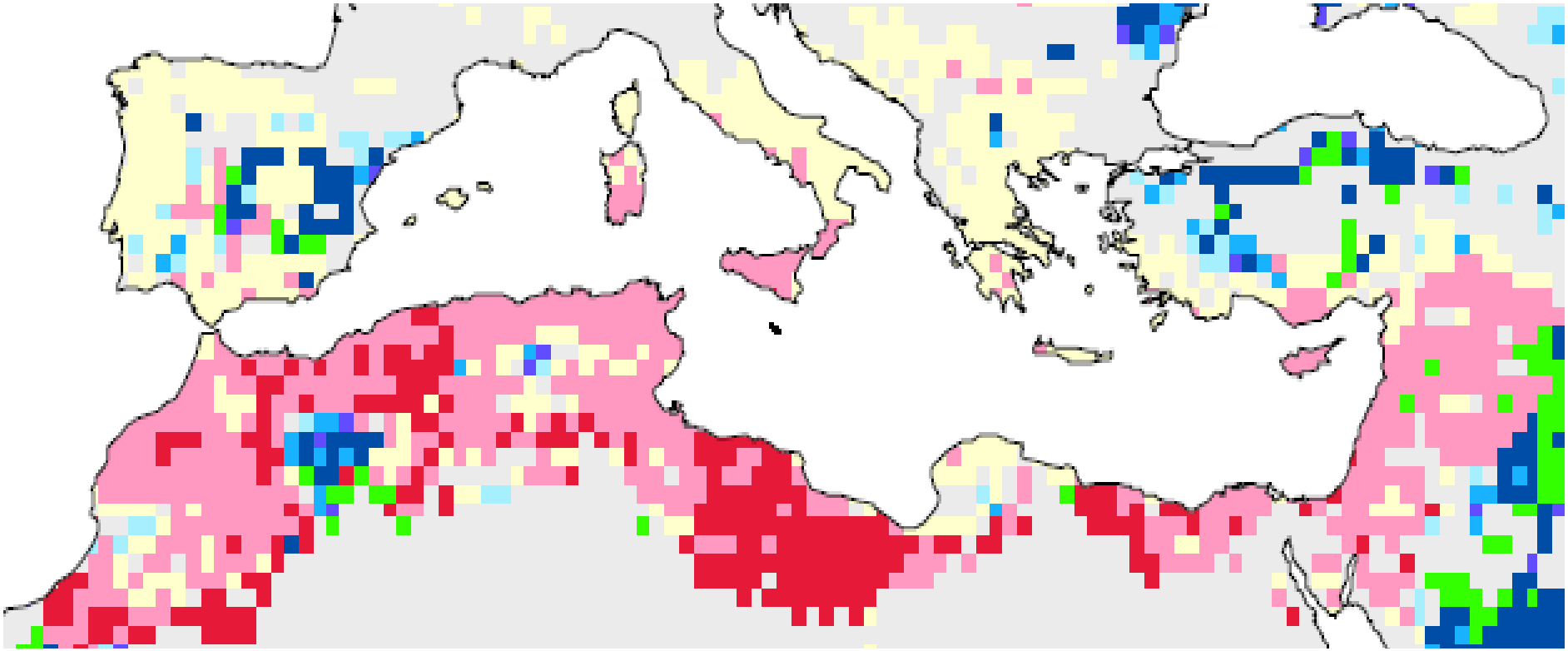
- **Demand management is important, but does not provide a route to agreement between the riparians as to the future of the basin, or any equitable and reasonable allocations of water.**

The Zero-sum Dilemma



Reallocation cannot be attained, as the more powerful party will not agree to any significant diminution of its available water resource.

Probable Climate Change



Change in groundwater recharge (%) from 1961-1990 to the 2050s

-100 -70 -30 -10 10 30 70 100 >

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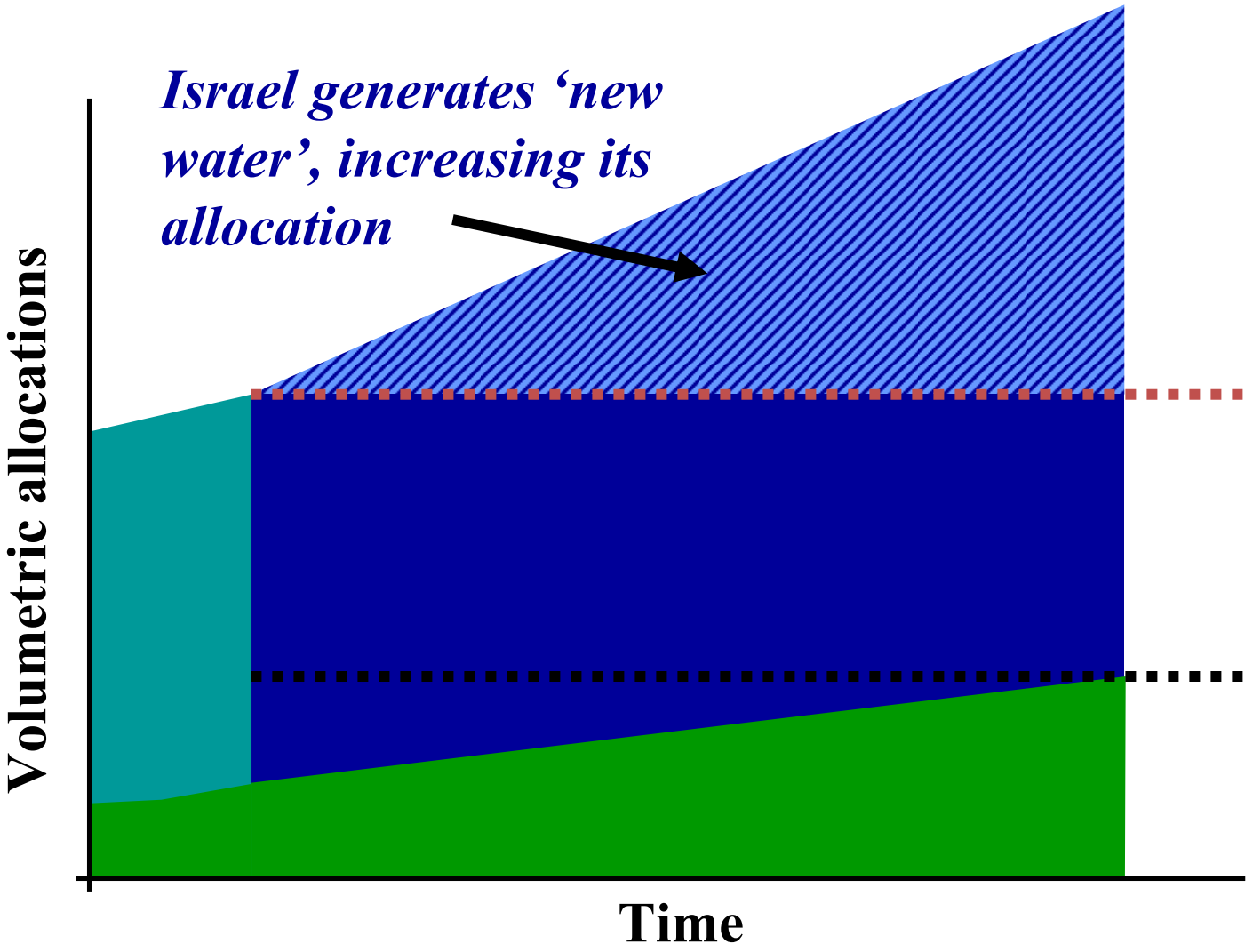
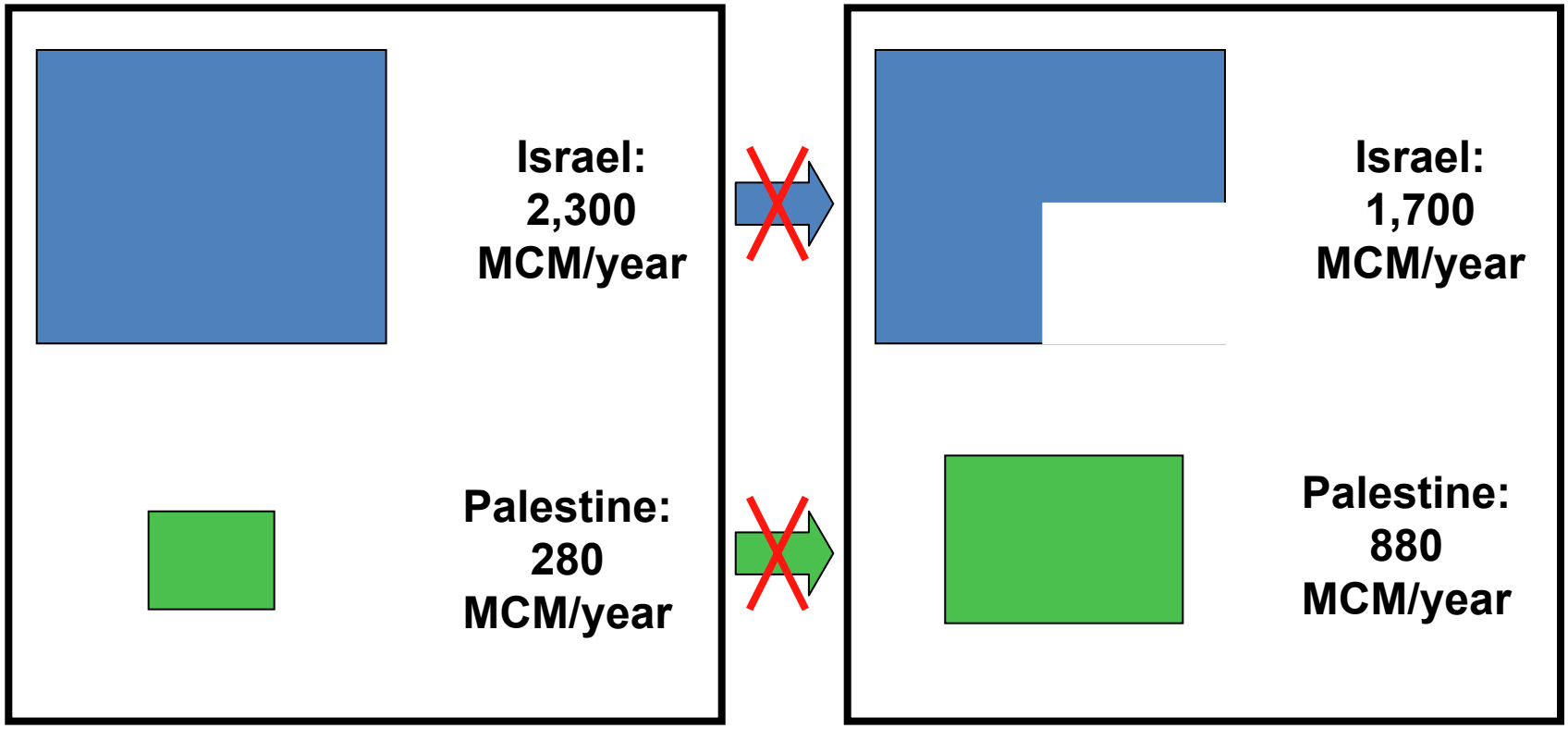
The Proposed Positive-Sum Outcome

- **The Positive-Sum Outcome (PSO) increases the total water volume available within the basin.**
- **This 'makes the pie bigger' and also allows reallocation to occur without any party losing water over time.**
- **New Water can be produced by:**
  - **desalination;**
  - **enhanced wastewater re-use;**
  - **improved Green Water/Blue Water management;**
  - **inter-basin transfers.**
- **Transition is the key concept, here.**

Bilateral Transition

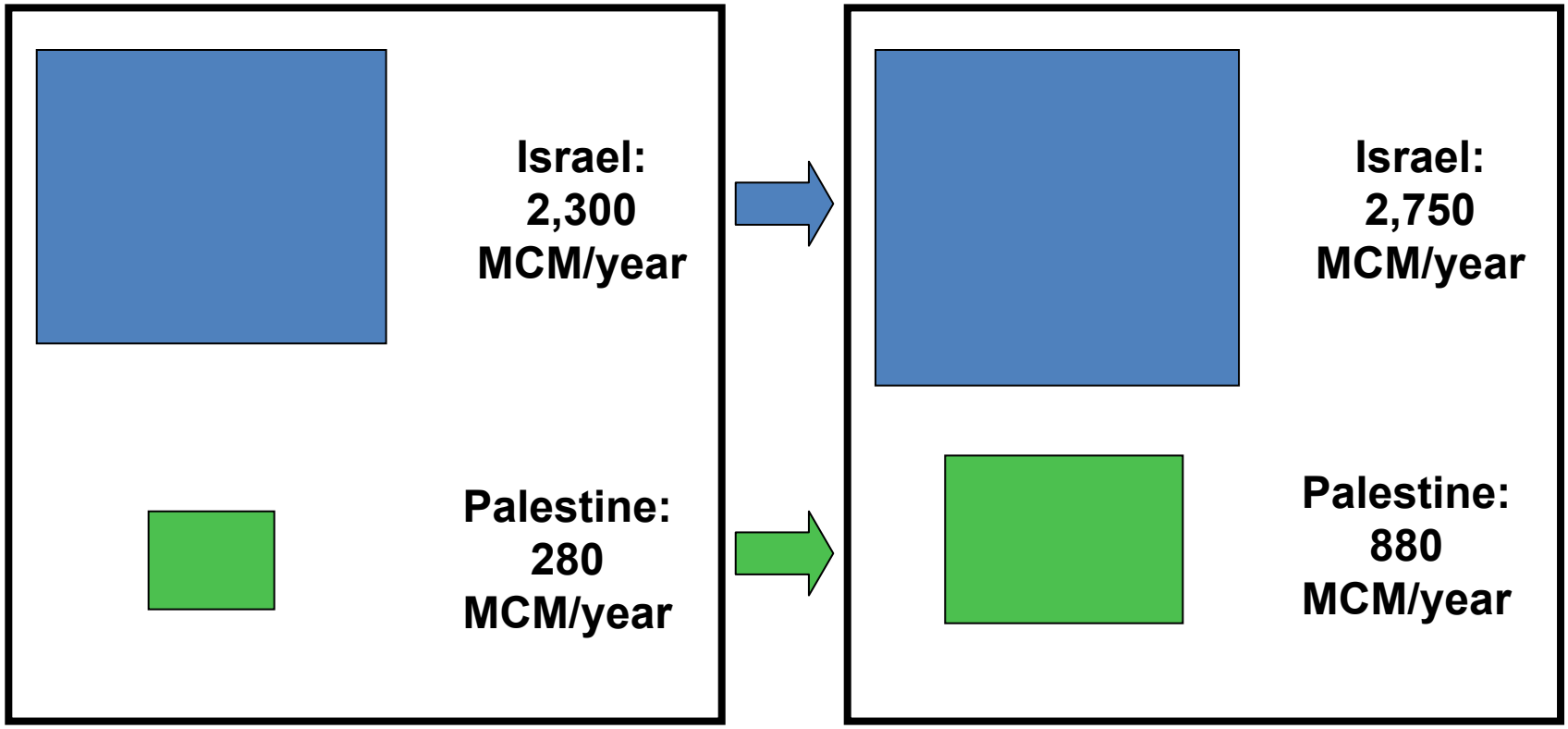


The Bilateral Zero-sum Dilemma



Reallocation cannot be attained, as the more powerful party will not agree to any significant diminution of its available water resource.

The Bilateral Positive-Sum Outcome



Reallocation can be attained, as both parties wish to enhance their water resource volumes over time, and the PSO achieves this.

Aligning the Bilateral and Multilateral PSOs

- **The bilateral (Palestine/Israel) and multilateral PSOs *must* be aligned, and fully compatible with each other.**
- **This is because any bilateral and multilateral agreements must not be allowed to 'poison each other', and it is uncertain which agreement would be signed first.**
- **A multilateral PSO has also been generated by the study team, to take account of this requirement.**
- **The multilateral PSO acknowledges the current and future water uses in all five co-riparians of the Jordan River basin.**

The Multilateral PSO: Main Water Sources [1]

- **Improvements in Flow Management:**

  - Green Water should be used more efficiently in the upper basin, especially in Syria.
  - This will drive enhanced Blue Water flows to the lower three riparians.

- **Desalination:**

  - High desalination capacities (and strong technology) exist in the region.
  - Three of the five riparians **must** include desalinated water in their future water supply strategies.

The Multilateral PSO: Main Water Sources [2]

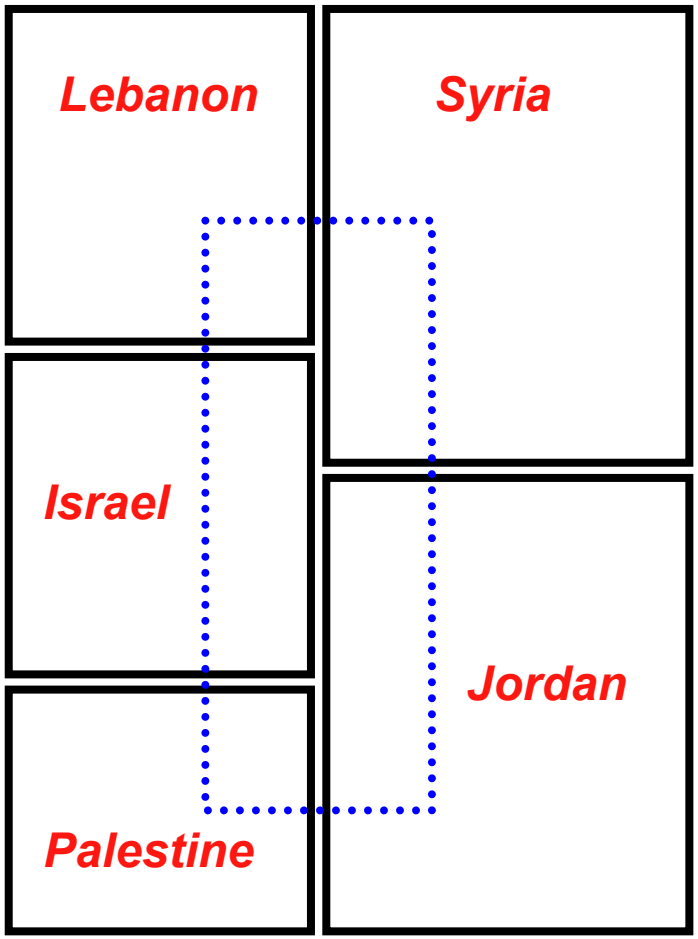
- **Wastewater Re-use:**

- Re-use is already considerable in Israel, and moderate in Jordan.
- Syria and Palestine in particular could improve re-use rates, but new sewage treatment works are required.

- **Inter-basin Transfers:**

- Several options exist of smaller scale, relevant to Lebanon and Syria especially.
- An option exists for a large-scale inter-basin transfer from Turkey to the Jordan River basin.

Multilateral Transition [0]

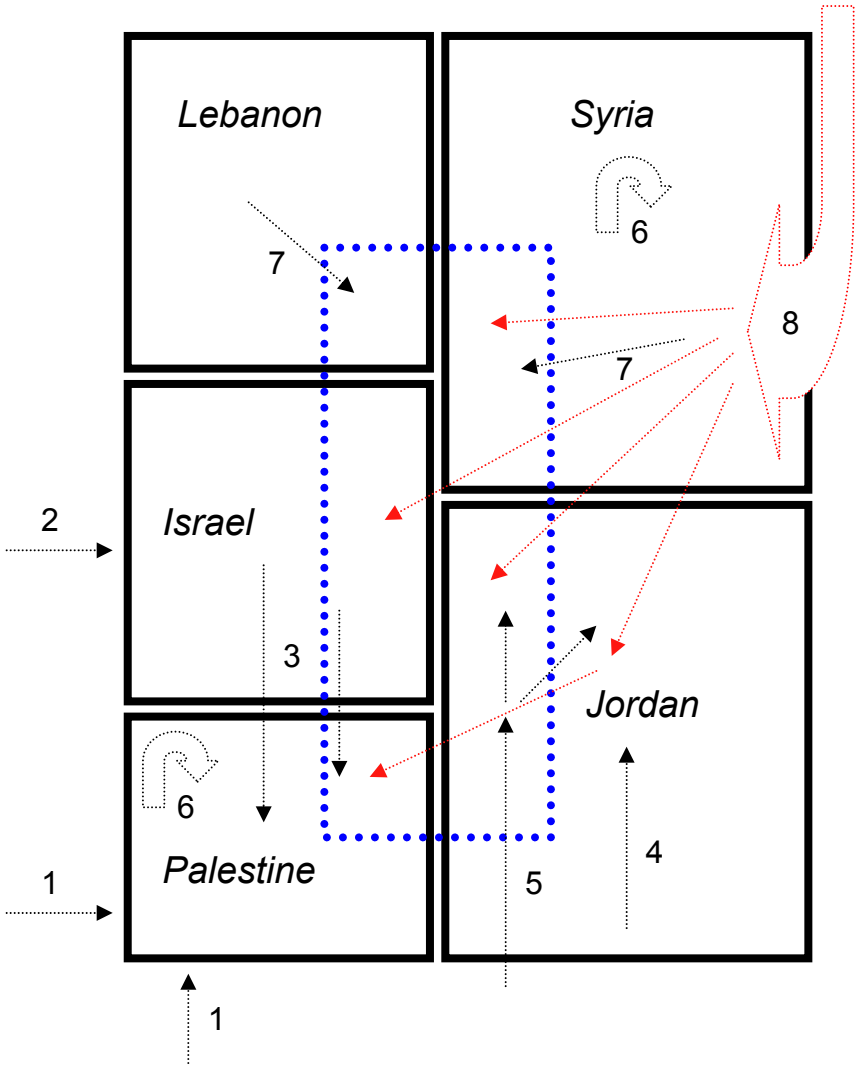


The water demand and supply scenarios have been analysed for the countries as a whole, with the Jordan River basin 'nested within this' (shown here within the dashed blue line).

'Reasonable demand' is again used, with equal *per capita* allocations of 350 m^3/year.

Current population growth rates and distributions are assumed to continue, unchanged.

Multilateral Transition



Components:

[1] Desalination, Gaza

[2] Desalination, Israel

[3] Reallocation, Israel/Palestine

[4] Disi abstraction, Jordan

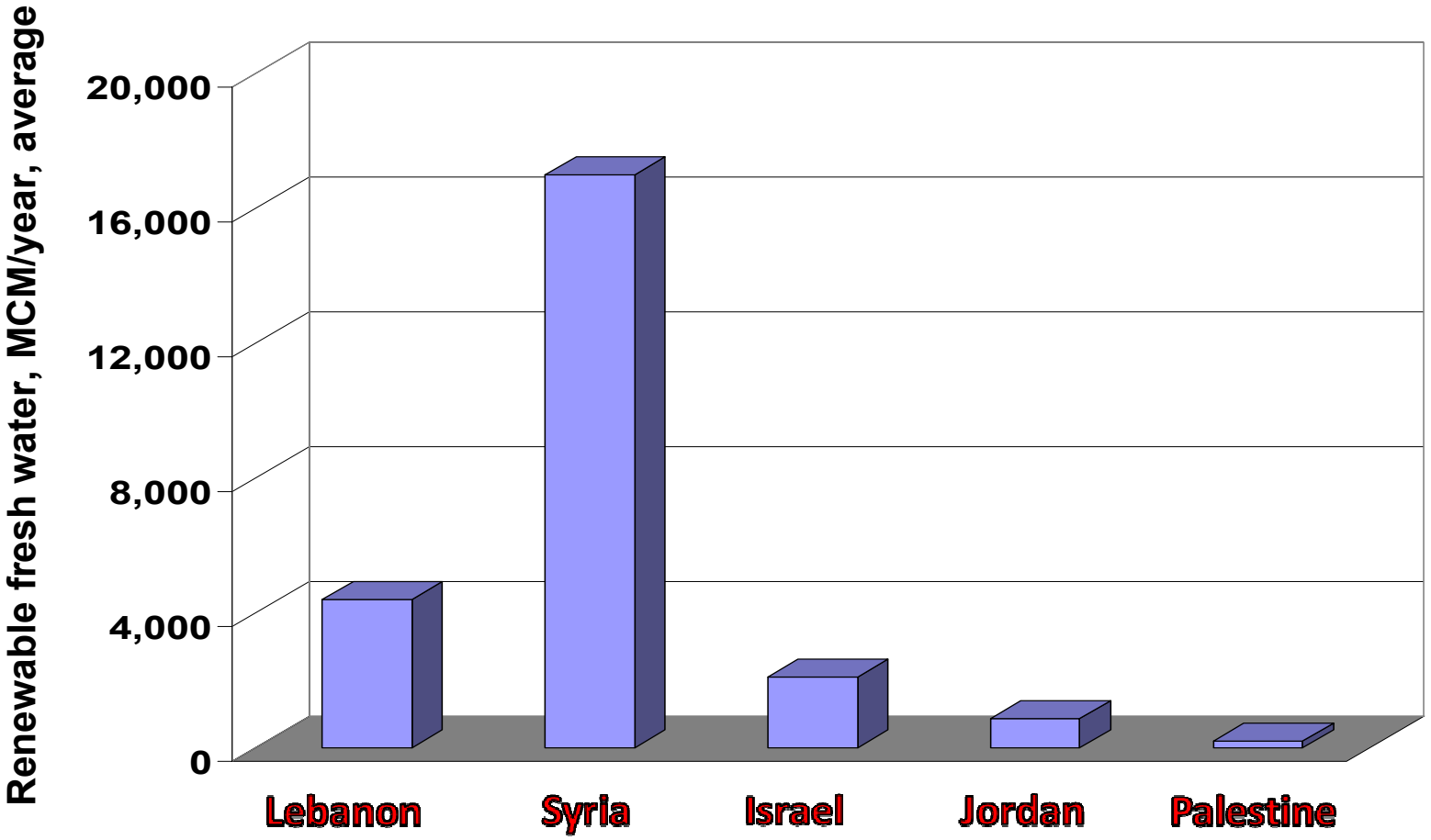
[5] Red-Dead Conduit, Jordan

[6] Wastewater re-use, Syria and Palestine especially

[7] Inter-basin transfers in-country, Lebanon and Syria

[8] Inter-basin transfer from the Seyhan/Ceyhan in Turkey

Relative Renewable Fresh Water Resources

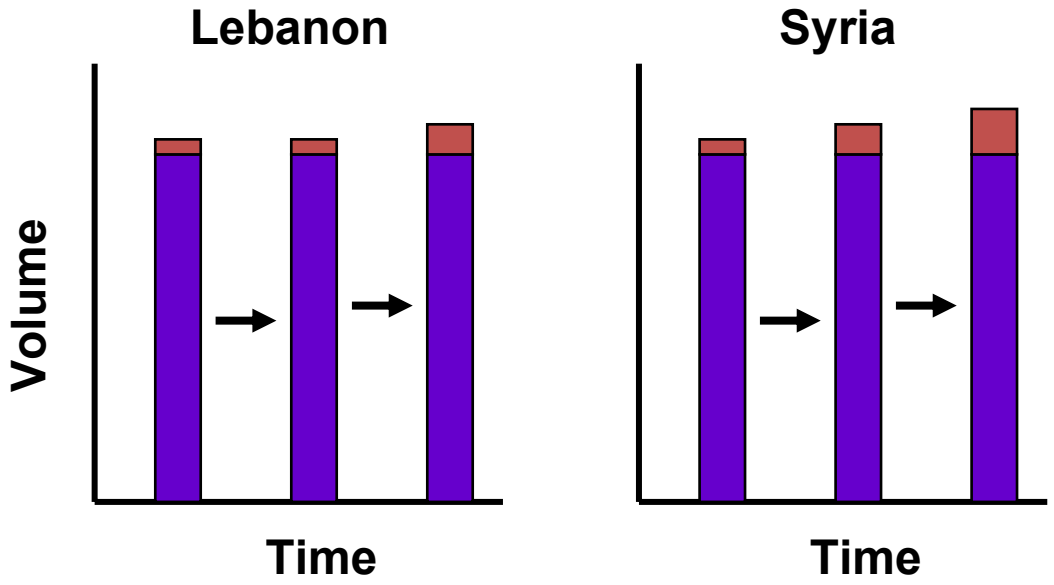


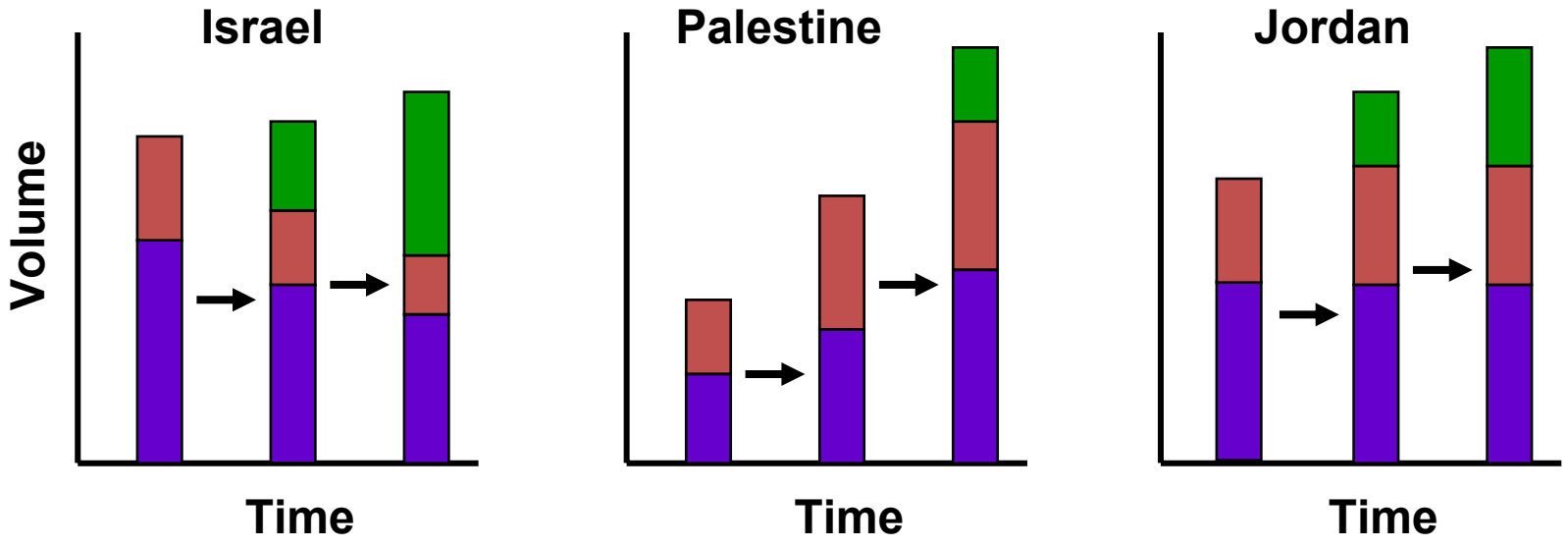
The Multilateral Transition, over time.

‘New water’

Surface waters

Other water resources





The Result of the PSOs

- The bilateral and multilateral PSOs will guarantee enhanced fresh water availabilities (on a *per capita* basis) to all five co-riparians, simultaneously.
- Within the transition period, reallocations will occur such that the availabilities approach equitable and reasonable allocations.
- No party ever experiences a zero-sum dilemma.
- The total volumes of New Water required are known, and are affordable.
- The PSO is much more affordable than continuing conflict between the co-riparians.

Key Messages

- **The availability of water in the basin can be improved markedly, generating the PSO.**
- **If this does not occur, the Zero-Sum Dilemma will obstruct improvements.**
- **The PSO solves all the existing problems, and is affordable.**

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The JRB: Economic Returns, Agriculture

Country	*Agriculture*		
	Allocation [MCM/y]	*Contribution to GDP [US$millions]*	***Ratio***
Lebanon	920	2,114	**2.30**
Syria	18,900	21,301	**1.13**
Israel	1,280	4,438	**3.47**
Jordan	760	1,043	**1.37**
Palestine	163	403	**2.47**

Water in the Agricultural Sector [1]

- **Israel's economic return per unit volume of Blue Water is much higher than those of other riparians.**
- **The differences are even greater when Green Water is taken into account.**
- **Great improvements can be made in the other four riparians.**

The JRB: Economic Returns, All Sectors

Country	**Ratios, Contribution to GDP** [US$m]/ **Sectoral Water Allocations** [MCM/y]		
	Agriculture	*Industry*	*Services*
Lebanon	**2.30**	**499**	**69**
Syria	**1.13**	**59**	**67**
Israel	**3.47**	**396**	**198**
Jordan	**1.37**	**74**	**115**
Palestine	**2.47**	**93**	**37**

Fresh water allocated to other sectors attains much higher returns!


Agriculturally-based Economy
Palestine: Transition constrained by the occupation.
Syria: Drive for food self-sufficiency; very low efficiency in the agricultural sector.
Lebanon and Jordan: In transition at present.
Israel: High GDP *per capita* already, but maintaining a strategic water reserve in the agricultural sector.
Industrial and Service-based Economy

The JRB: The TWO Analysis Matrix

Factor:	***Riparian/ Activity***	***Efficiency, Water Use***	***Flow Management***	***Desalination***	***Wastewater Re-use***	***Inter-basin Transfers***
Primary production	Lebanon					Later stage
	Syria	**High**	**High**		**High**	
	Israel	Ongoing			Ongoing	
	Jordan	**High**			Ongoing	
	Palestine	**High**			**High**	
Hydropower	All	Low for the basin as a whole; moderate in Syria externally.				
Urban Growth and Industrial Development	Lebanon	Ongoing				Later stage
	Syria	**High**				
	Israel	Ongoing				
	Jordan	**High**				
	Palestine	**Critical**				
Ecosystem Services	*Fisheries*					
	Tourism	Dependent on a sustainable peace.				

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Water Use in the JRB: Key Conclusions [1]

- The present allocation/utilization of fresh water in the basin is inequitable and unreasonable.
- Within-basin shortages of water are a particular problem for all the Arab co-riparians.
- Climate change is likely to make matters worse, over time.
- The availability of water in the basin can be improved markedly, generating the PSO.
- If this does not occur, the Zero-Sum Dilemma will obstruct improvements.
- The PSO solves all the existing problems, and is affordable.

Water Use in the JRB: Key Conclusions [2]

- A scheme is available to introduce the PSO over time, and the TWO Analysis then shows how the fresh water may best be used.
- The intra-sectoral efficiency ('water productivity') can be increased markedly in the agricultural sector.
- The inter-sectoral reallocation of water will give rise to much greater economic returns.
- The Parties can continue to compete, or can start to cooperate -- and all can markedly increase their net benefits from the basin.

Thank you for your attention.