

Water Allocation Towards Constructive Engagement along the Jordan River Basin

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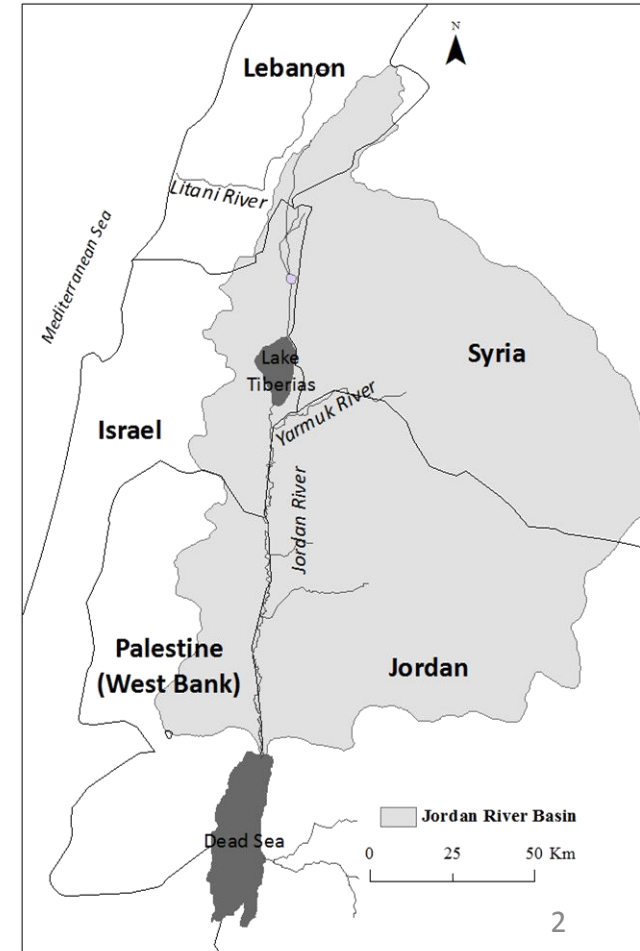
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Transboundary Water Resources: Resource assessment and allocation

PS12.4005

- JRB one of most intricate transboundary water conflicts due to Arab-Israeli conflict
- It is shared by 5 riparians:
 - Israel
 - Jordan
 - Lebanon
 - Palestine
 - Syria
- No comprehensive agreement among riparians
- Mainly bilateral agreements (Syria-Jordan, Israel-Palestine, and Israel-Jordan)
- Existing forms of bilateral cooperation did not resolve any of the water conflict aspects

⇒ *Need a catalyst to induce cooperation over transboundary water management*



- Allocate JRB waters according to criteria of United Nations (UN) Convention on the Law of the Non-Navigational Uses of International Water Courses of 1997
- Develop an Integrated Regional Water Resources Management Plan
- Propose a positive-apportionment framework that uses energy as a catalyst for motivating riparians into cooperation

UN Convention Criteria	Quantification Approach
Geography	Basin area
Basin Hydrology	Water flow
Precipitation	Average annual total rainfall
Existing water utilization	Reported riparian abstractions
Economic needs	Agricultural sector contribution to national GDP
Social needs	National agricultural workforce
Basin population	Country population living within basin area
Costs of alternative water	Cost related to seawater desalination
Availability of other water resources	Water stress index
Potential for harm	Water shortage assumed to cause equal harm in all countries

- Calculate normalized score for each criterion

$$F_{i,j} = \frac{X_{i,j}}{(\sum_{i=1}^n X_{i,j})} * 100$$

- i riparian country (from 1 to n=5)
- j number of allocation criteria (from 1 to m=10)
- $X_{i,j}$ value assigned to i^{th} country with respect to the j^{th} criterion
- $F_{i,j}$ percentage normalized score assigned to riparian i with respect to criterion j

- **Scenarios**
 - Equal weights
 - 30% & 50% weights to each criterion
 - Average of expert assigned weights

- **Sensitivity Analysis**
 - Vary weights for each criterion by 5% increments

- Calculate weighted overall score for each riparian

$$S_i = \frac{(\sum_{j=1}^m F_{i,j} * W_j)}{(\sum_{i=1}^n \sum_{j=1}^m F_{i,j} * W_j)}$$

- W_j weight assigned to j^{th} criterion
- S_i overall score for i^{th} riparian, ranging between 0 and 100%

Quantified criteria with normalized scores

UN Convention Criteria	Normalized Scores (%)				
	Israel	Jordan	Lebanon	Palestine	Syria
Basin Geographical area	10.4	40.2	3.8	8.6	37.1
Water Flow	11.6	37.8	8.6	11.0	31.0
Precipitation	18.5	12.2	31.7	13.4	24.2
Existing water use	58.8	21.3	0.8	0	19.1
Economic needs	7.4	9.3	12.9	17.7	52.6
Social needs	4.0	5.0	18.1	30.0	42.8
Within basin population	4.5	70.0	1.5	6.0	18.0
Costs of alternative sources of water	13.9	28.7	13.9	23.8	19.7
Availability of other water resources	11.6	20.7	9.3	55.0	3.4
Potential for harm	20.0	20.0	20.0	20.0	20.0

- Irrespective of assigned weights, current pattern of water allocation does not conform to international water law guidelines
- Jordan, Lebanon and Syria are underutilizing water from JRB as compared to their potential water rights
- Palestinians are entitled to a share in basin's water, but are currently allocated none

Scenario	Percentage Allotted Share (%)				
	Israel	Jordan	Lebanon	Palestine	Syria
Equal Weights	16.1	26.5	12.0	18.6	26.8
Questionnaire based	21.1	27.7	11.0	15.0	25.2
Range of all scenarios	10.7-35.1	17.0-45.9	7.1-20.8	10.3-34.7	16.4-38.3
Existing allocation pattern	58.8	21.3	0.8	0	19.1

Sensitivity analysis revealed the most significant criteria enhancing water share for each riparian country

Country	Most significant criterion to increase water share from JRB	5% increase in weight will increase allotted water share by
Israel	– Existing Utilization	+2.4%
Jordan	– Within basin population – Share of basin area	+2.4% 0.8%
Lebanon	– Precipitation	+1.1%
Palestine	– Social need – Availability of alternative sources of water	+0.6% +2.0%
Syria	– Economic need – Social need – Share of basin area	+1.4% +0.9% +0.6%

Integrated Regional Water Resources Management Plan

Main Components

Negotiate agreements

Major Implementation Initiatives

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Institution for joint management of shared regional water resources	<ul style="list-style-type: none"> – Share data for sound planning and operation of management systems – Monitor water levels (flow rates) and quality – Develop hydrological model for the JRB that uses a common dataset – Develop joint river water commission with detailed conflict resolution mechanisms

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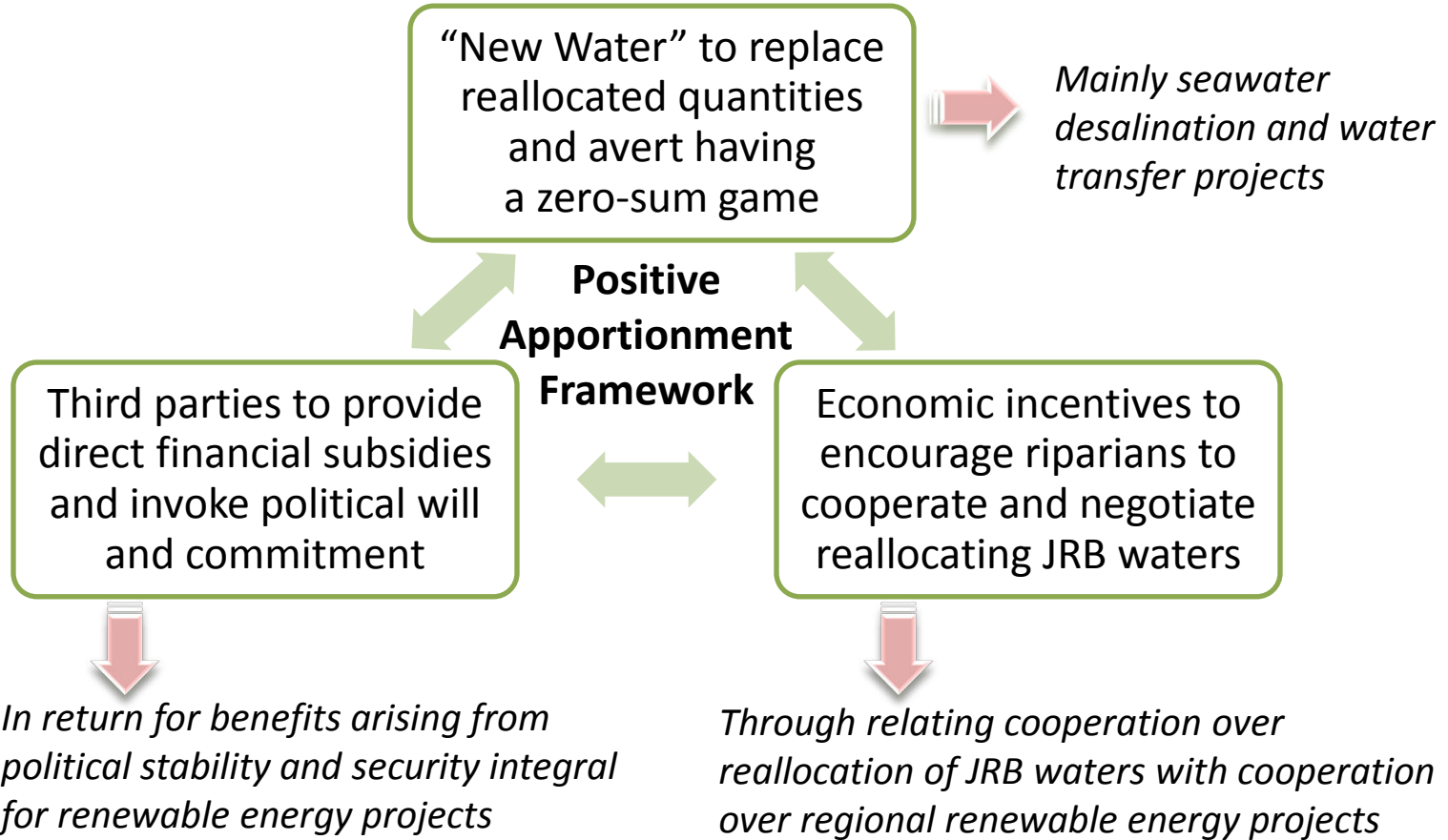
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Enhance regional public awareness	– Involve communities in JRB monitoring



- Successful water allocation benefits from joint management with due considerations to international water law criteria
- Establishing a connection between water and energy projects can create economic incentives for attracting riparians into cooperation over reallocating and managing transboundary water resources

THANK YOU