

Nexus solutions in the water
sector and opportunities from
regional and transboundary
cooperation-Jordan

Setting the Context

- Jordan faces a severe water shortage. As a result, more pressure is being added on the ground water to cover part of water deficit.
- Water pumping and other water services (including Agriculture) consume large amount of energy (~15% of the electricity).
- In near future, additional energy will be needed to deal with an expanding water supply through desalination and wastewater treatment.
- The agriculture sector accounts for the largest share of water demand (around 50 percent).
- as a consequence of water-scarcity, Jordan faces increasing food insecurity.

The Project

The project aims at supporting this transformational change and aims at setting the proper framework for implementing the 2030 Agenda for water efficiency and productivity (SDG 6.4) and define the safe boundaries for effective water sustainability. The project is currently being implemented in eight countries in the NENA region: Algeria, Egypt, Jordan, Iran, Lebanon, Morocco, Tunisia, and Palestine.

Water- energy- food Nexus Objective (WEPS-NENA project)

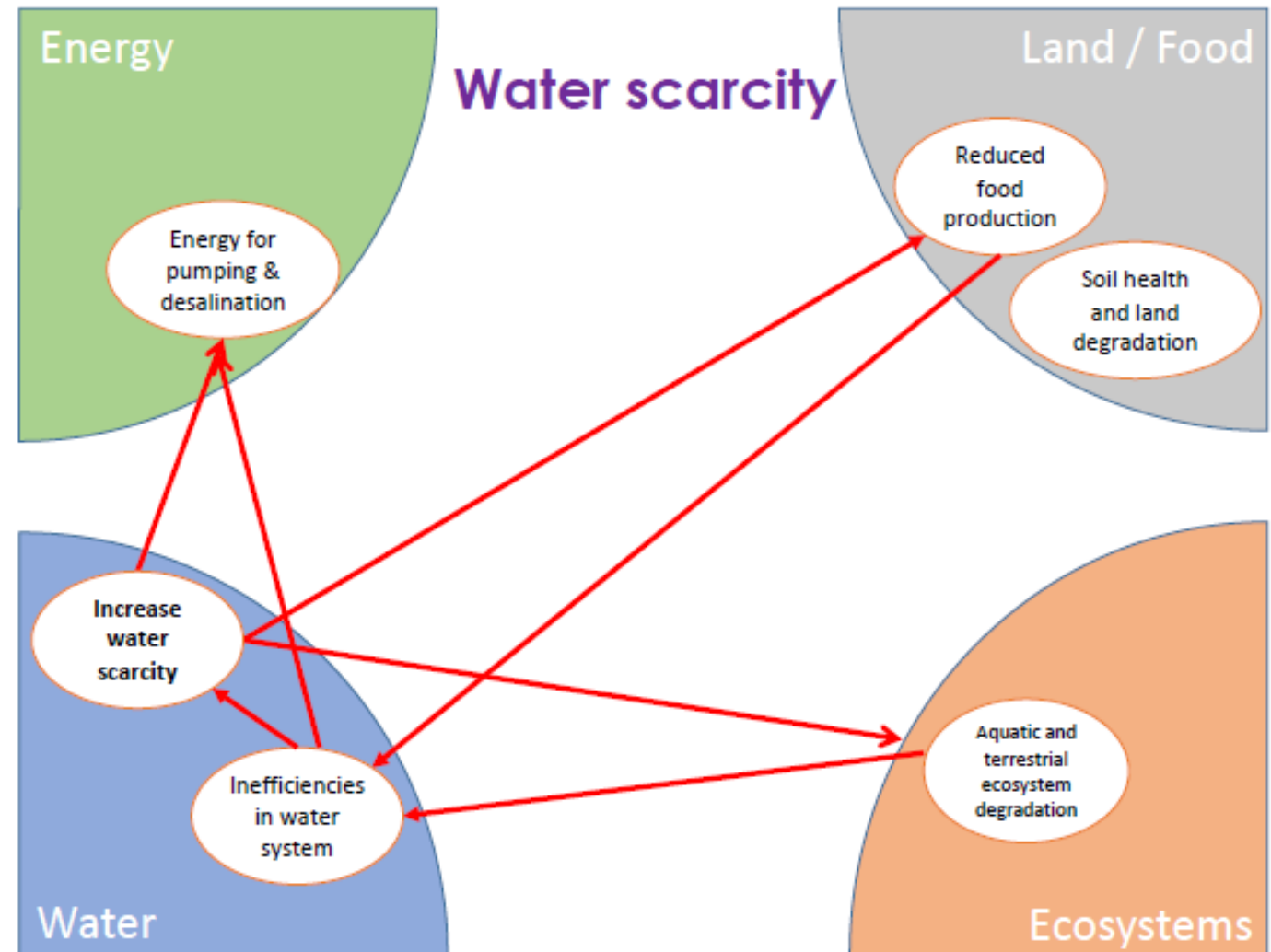
To build an integrated WEF-Nexus model that enables understanding the trade-offs and synergies when considering policies and infrastructure based on a single sector against those across multiple sectors. The model also allows for assessing the impact of some interventions/solutions.

Key Nexus challenges in Jordan

➤ Nexus Challenges and solutions were identified through direct and continues collaboration and dialogues with the MWI, MOEMR, MOA, NARC and MoE.

priority challenges:

- Water scarcity.
- Agricultural productivity.
- Water quality.
- Shift to energy independence.



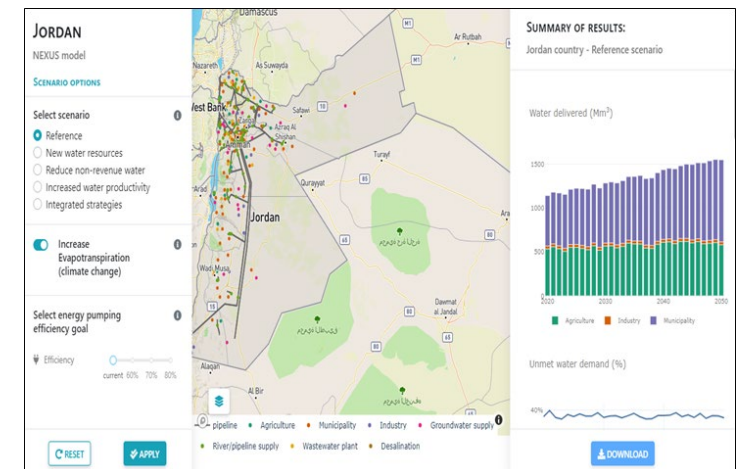
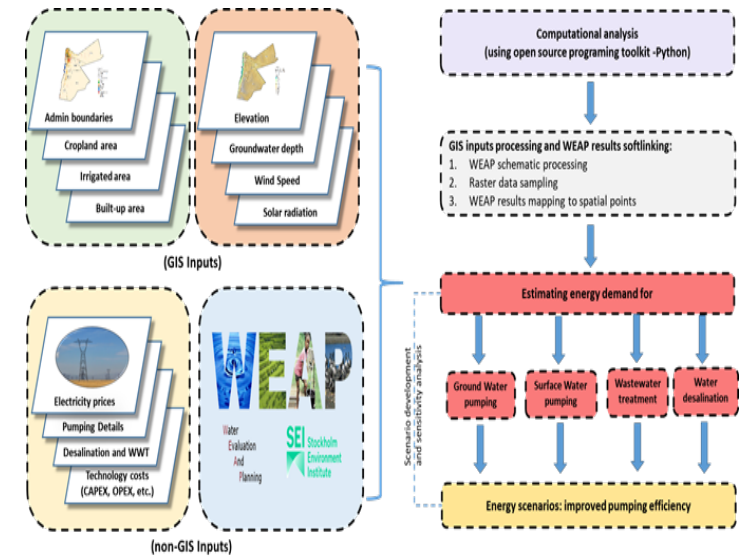
Possible WEF Nexus solutions/scenarios

- **Reduction of losses:** reduction of non-revenue water by 20% and 40%.
- **New water resources:** assumes the realization of the Red Sea-Dead Sea project and new desalination plant Red-Dead (110 MCM/yr)
- **Agricultural water productivity:** assumes an increase in the production of crops per m³ of water applied based on historical trends for each major crop
- Increased pumping **energy efficiency:** investigates an increased energy efficiency in water pumping (groundwater and conveyance)
- **Integrated nexus interventions:** combining all of the above

Overview of the modelling structure

➤ **3 models were identified, based on the proposed challenges, and integrated to form the WEF Nexus model.**

- Water Evaluation And Planning (**WEAP**) model (to estimate non-agricultural water demands, supplies and allocations in order to assess the sustainability of the water system);
- **MABIA** model (to estimate crop production based on the availability of water); and
- **GIS-based energy** modelling tool (to estimate the energy requirements for water pumping, water desalination and wastewater treatment).



The platform can be accessed from this address <https://jordan-nexus-model.herokuapp.com/>

Summary of the WEF model by year 20250

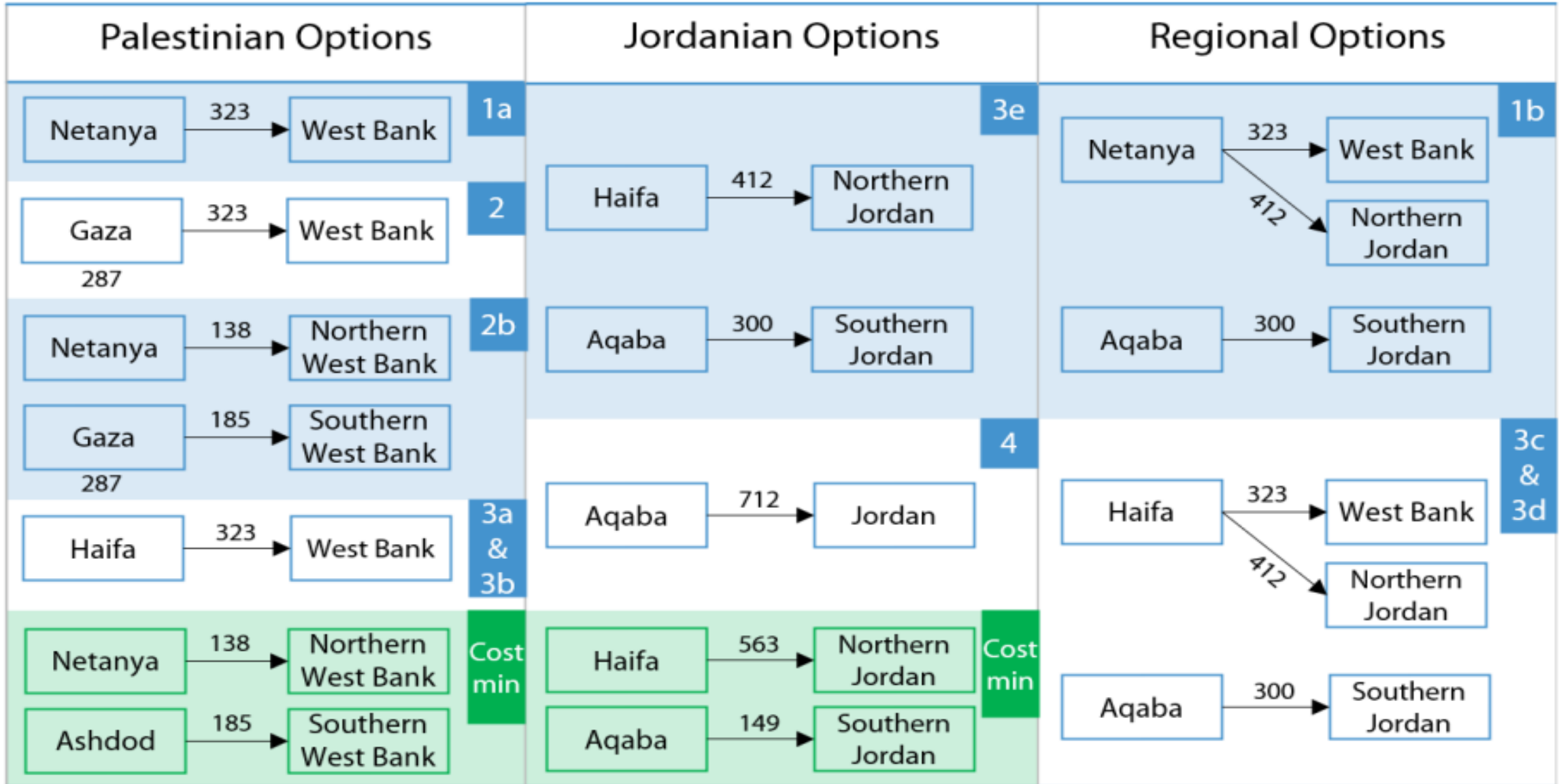
Scenario	Municipal unmet demand (%)	Agricultural unmet demand (%)	Aquifer water table depth (m)	Energy demand (GWh)	Agricultural productivity (kg/m ³)
No intervention	18.3%	37.8%	AZ -139 m JV -63 m DS -174 m	4332	3.44
Reduced NRW	14.3% ↓	37.8% —	AZ -139 m — JV -70 m ↑ DS -171 m ↓	3814 ↓↓↓↓	3.43 —
New Resources	12.7% ↓↓	37.5% —	AZ -139 m — JV -63 m — DS -161 m ↓↓	4447 ↑	3.44 —
Increased water productivity	18.3% —	33.4% ↓↓	AZ -133 m ↓ JV -51 m ↓↓↓ DS -167 m ↓↓	4202 ↓↓	4.05 ↑↑
Integrated strategies	8.8% ↓↓↓	33.2% ↓↓	AZ -133 m ↓ JV -58 m ↓↓ DS -152 m ↓↓↓	3869 ↓↓↓	4.02 ↑↑

Transboundary Strategies for the Resolution of the Water Deficit Problem in the Middle East

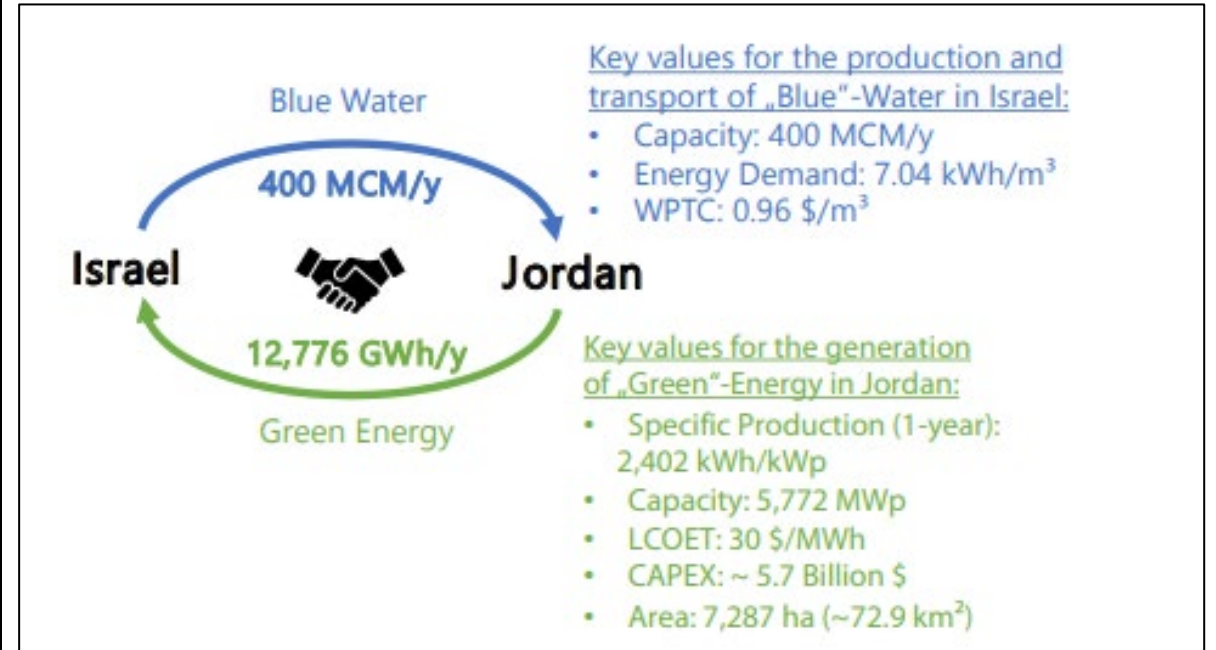
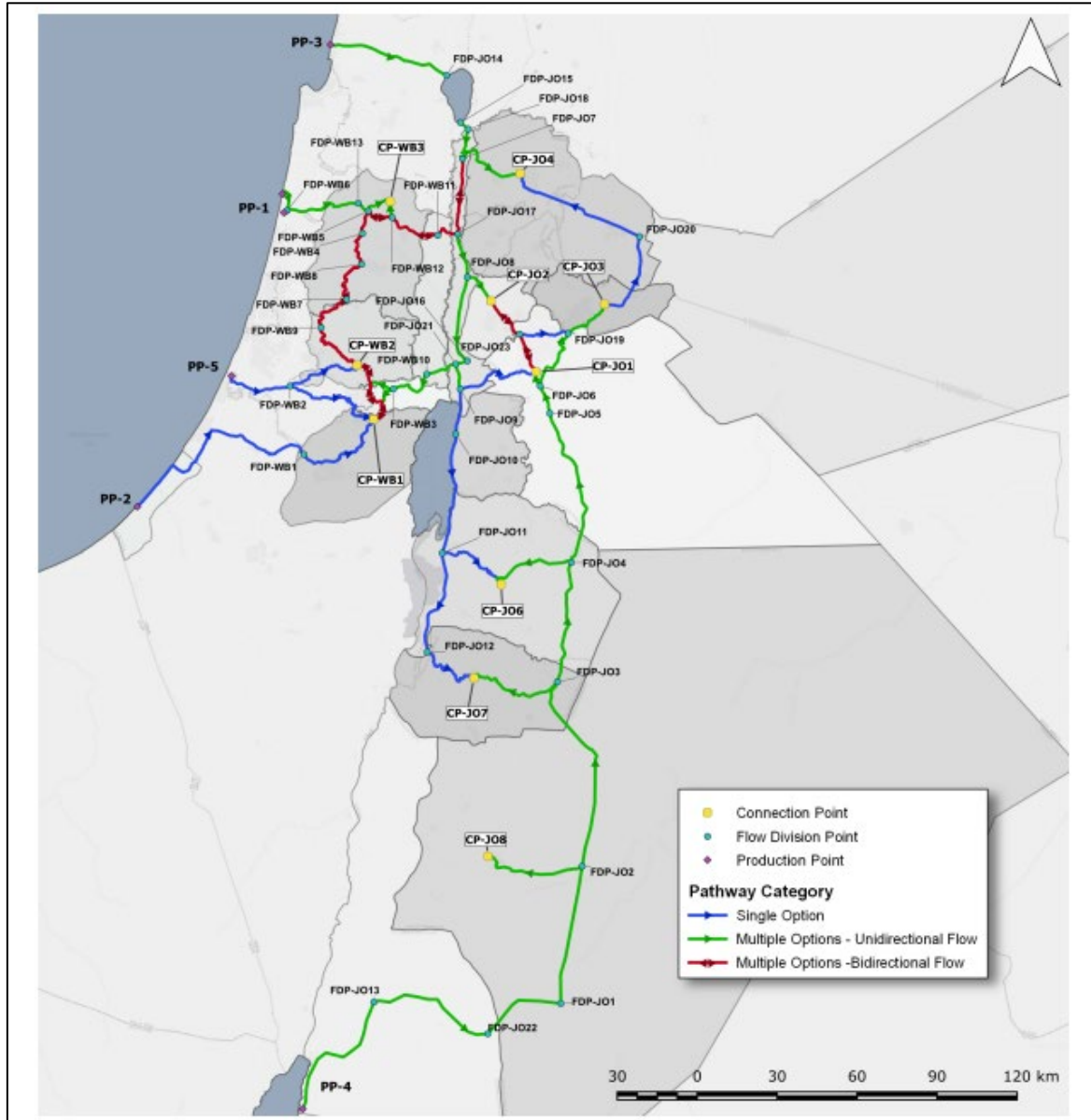
The SALAM Initiative (2020-2022) is a unique multilateral research and development project funded by the Federal German Ministry of Education and Research (BMBF) focusing on transboundary water transfer and national water strategies to solve the water deficit problem of the region and to deescalate a regional water crisis, bringing together decision-makers and stakeholders of the region.

The project consortium consists of 19 partner organizations from Jordan, Israel, the Palestinian Territories and Germany and includes universities, research centers, consulting companies, engineering firms, water utilities and the region's national water authorities. SALAM is an initiative of the Georg-August-University of Göttingen and the German company Rusteberg Water Consulting.

Project Results



Project Results



Opportunities for Nexus Solutions

- The Joint cooperation projects provide the scientific and the technical backgrounds for future infrastructure projects
- The Jordanian- Israeli Water for Energy Deal which is still an Issue being discussed on political levels
- Other Water Bilateral Agreements like the Jordan/Syrian agreement (1987) is an opportunity for Nexus Solutions (Generation of renewable energy from Unity Dam)
- The National Carrier Project (Desalination in Aqaba) is designed based on using renewable energy (50%)
- Electricity Grid connections with Neighboring country (Jordan, Egypt, Iraq, Syria, Lebanon) paves the road towards future Nexus Solutions