



Council for Development and Reconstruction (CDR)
Ministry of Energy and Water (MoEW)
Water Establishment Beirut and Mount Lebanon (WEBML)

Federal Institute for Geosciences
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Hannover, Germany

German-Lebanese Technical Cooperation Project

Water balance for the Jeita groundwater catchment using WEAP

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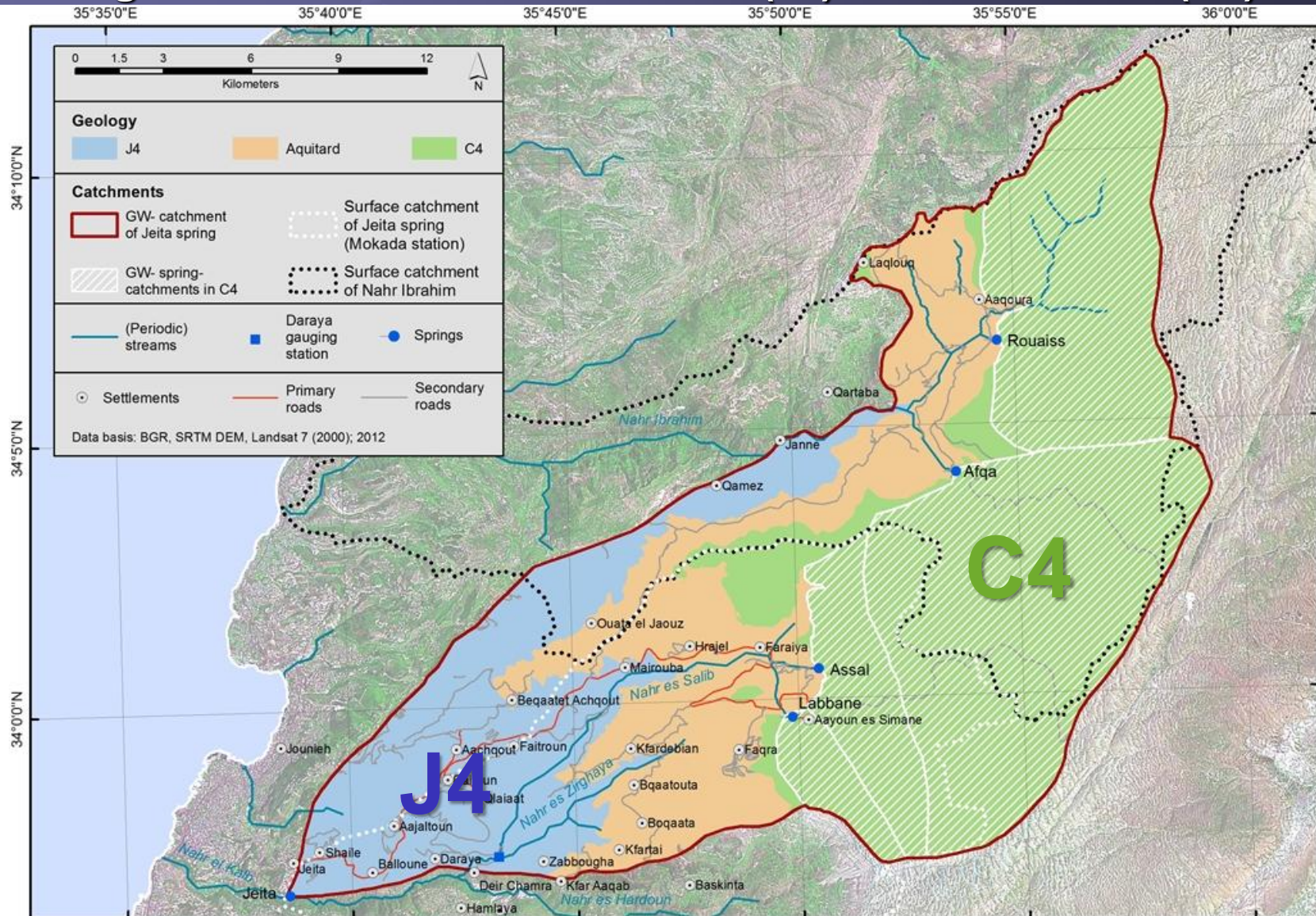
Outline

- I. Problem statement
- II. Objectives of the model
- III. WEAP model
- IV. Results
- V. Conclusion



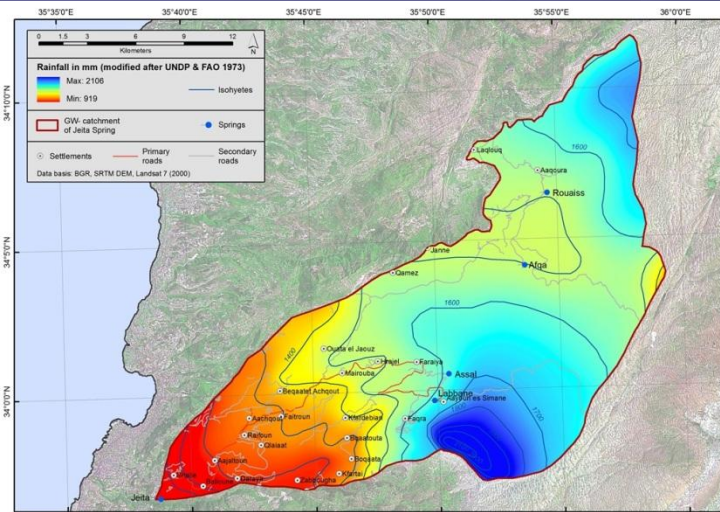
I. Problem statement

- High karstification of the Jurassic (J4) and Cretaceous (C4)



I. Problem statement

- Quantity of Jeita discharge influenced by:



Climate



Ecosystem

Agriculture



Domestic



I. Problem statement

- Seasonal variation of discharge of Jeita Spring

Average monthly discharge of Jeita Spring in MCM
between 1966 & 1971



II. Objectives of the model

- Hydrological balance on a monthly basis
- Assessment of hydrological components:
 - Rainfall
 - Evapotranspiration
 - Surface runoff
 - GW recharge
- Domestic & agricultural demand
- Origin of Jeita's groundwater
- Water management options: MAR



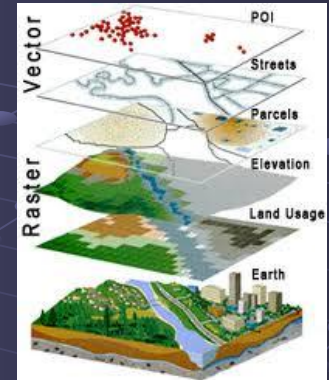
III. WEAP model

- Water Evaluation and Planning
- Non-commercial software
- Developed by the Stockholm Environment Institute
- Used within the MENA region
 - Jordan, Morocco, Tunisia, Palestine, Syria
- Conceptual in- & output model
- Modeling of hydrological budget
- Natural and anthropogenic supply and demand

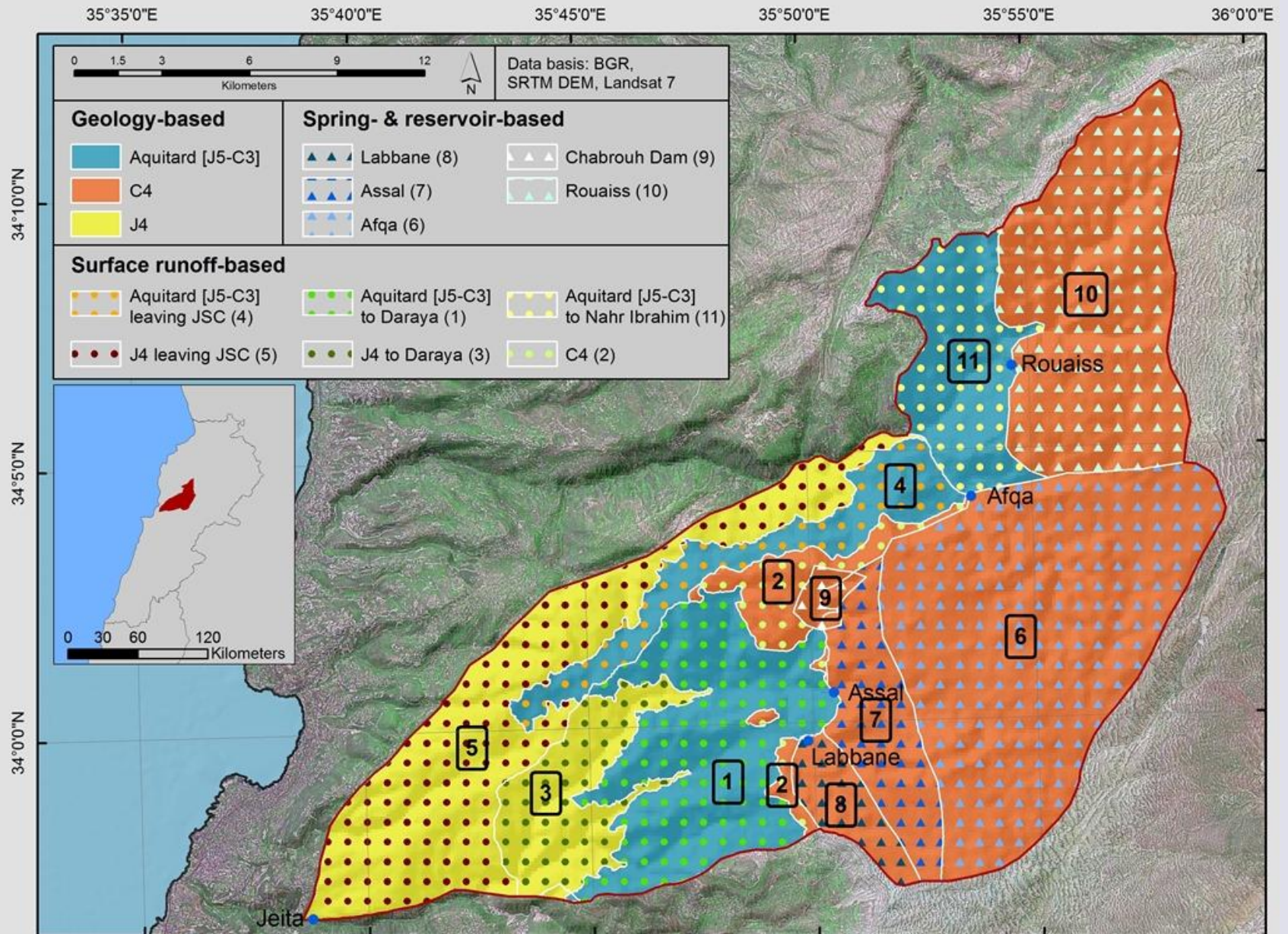


III. WEAP model

- Discretization
- Sub-division into 11 sub-catchments
 - I. Geology
 - II. Surface runoff
 - III. Spring- & reservoir catchments
- Reflect spatial variability:
 - Topography
 - Rainfall
 - Evapotranspiration

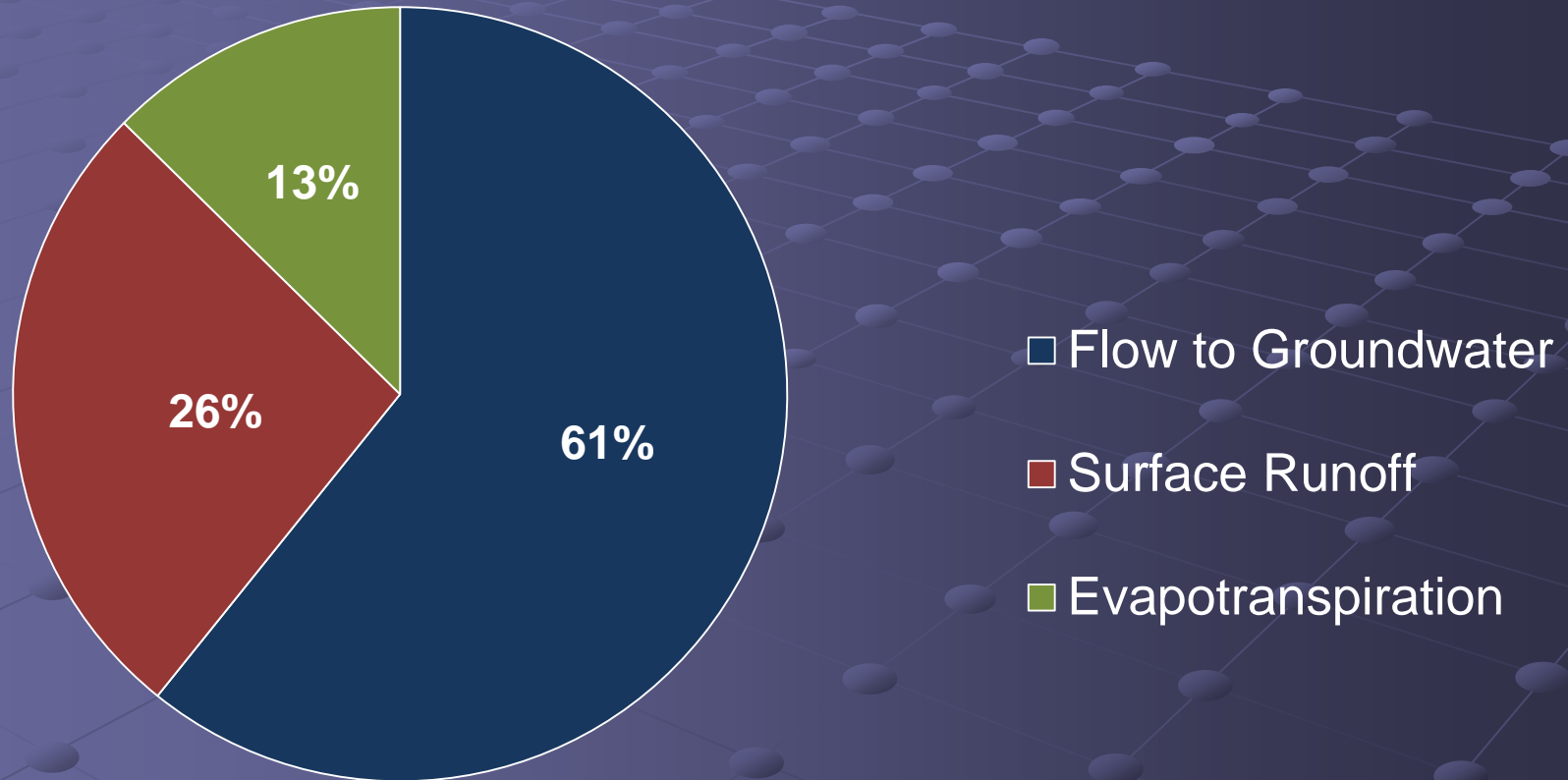


III. WEAP model



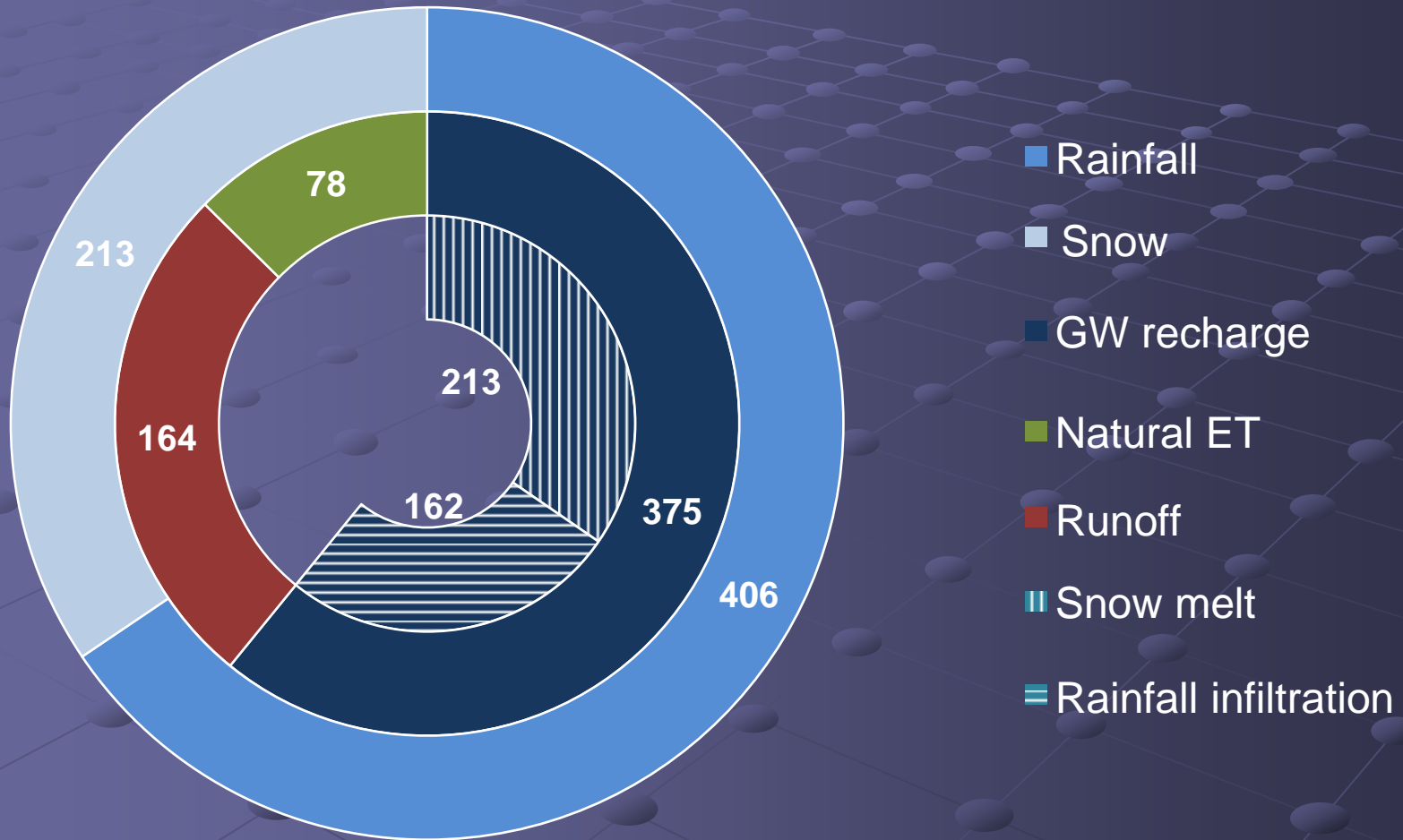
IV. Results

Total annual precipitation leads to:

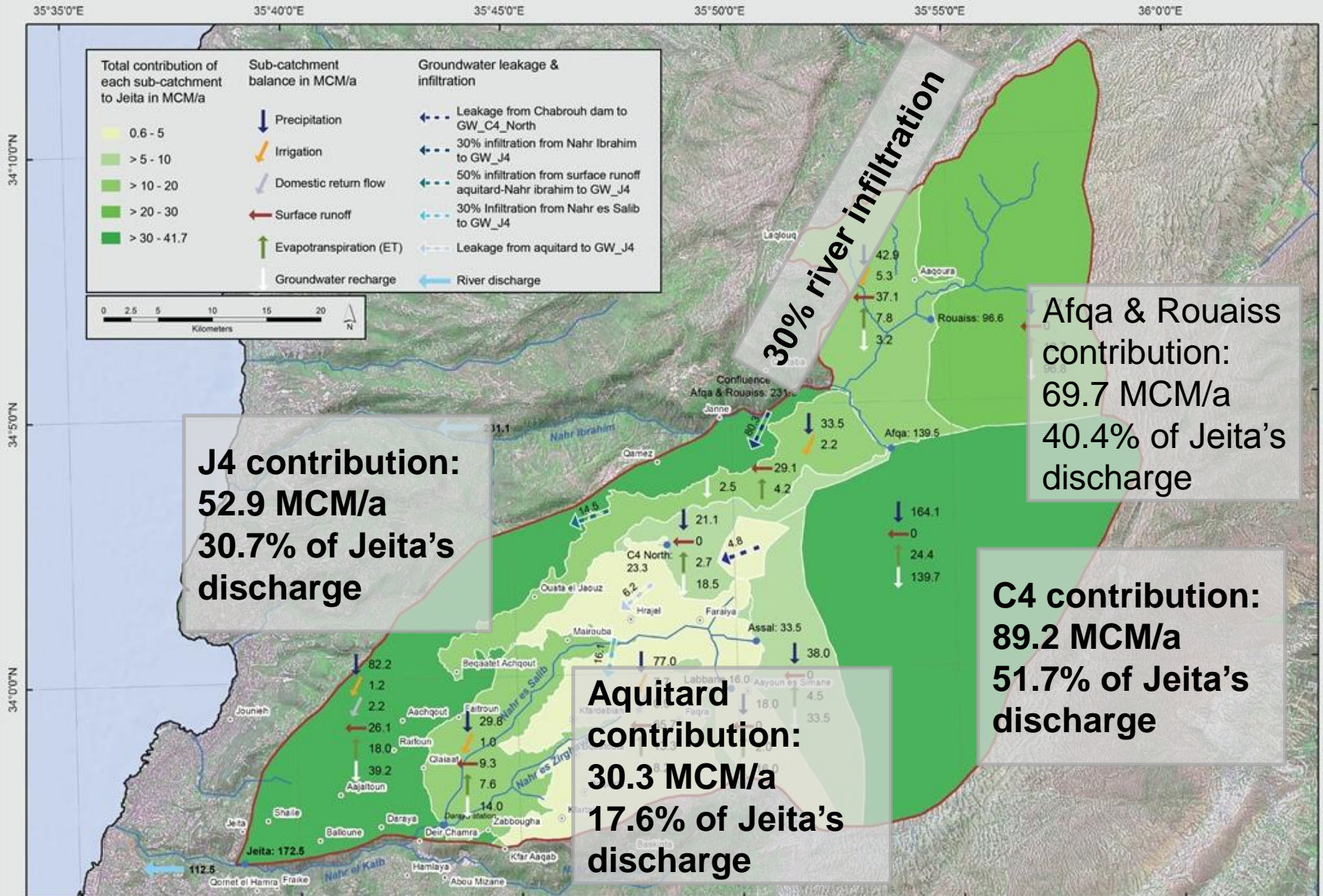


IV. Results

Natural annual water balance of the Jeita Spring catchment in MCM



IV. Results



V. Conclusion

- > 50% of Jeita's annual discharge comes from the C4
- > 40% of Jeita's annual discharge comes from Afqa and Rouaiss Spring
- Large quantities of water resources are unused: 164 MCM direct runoff per year
- Potential for MAR: Increasing discharge at Jeita and reducing the water shortage period



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www.arabische-kalligraphie.ch

& Thank You!

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Protection of Jeita Spring

