Hydrogeology informing transboundary aquifer management policy

A Malawi Case Study

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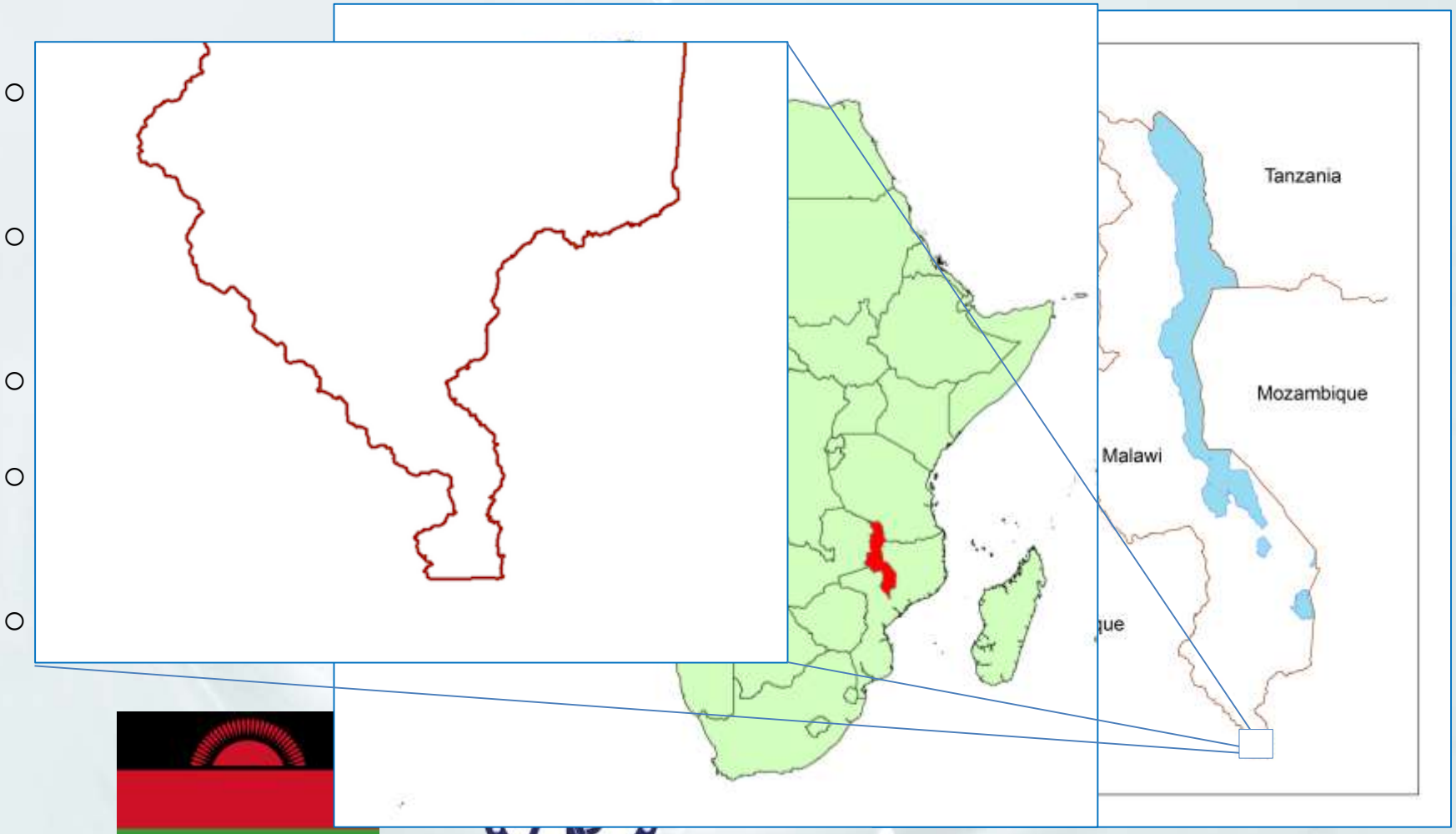
Study Area – Malawi



Current TBA Assessments

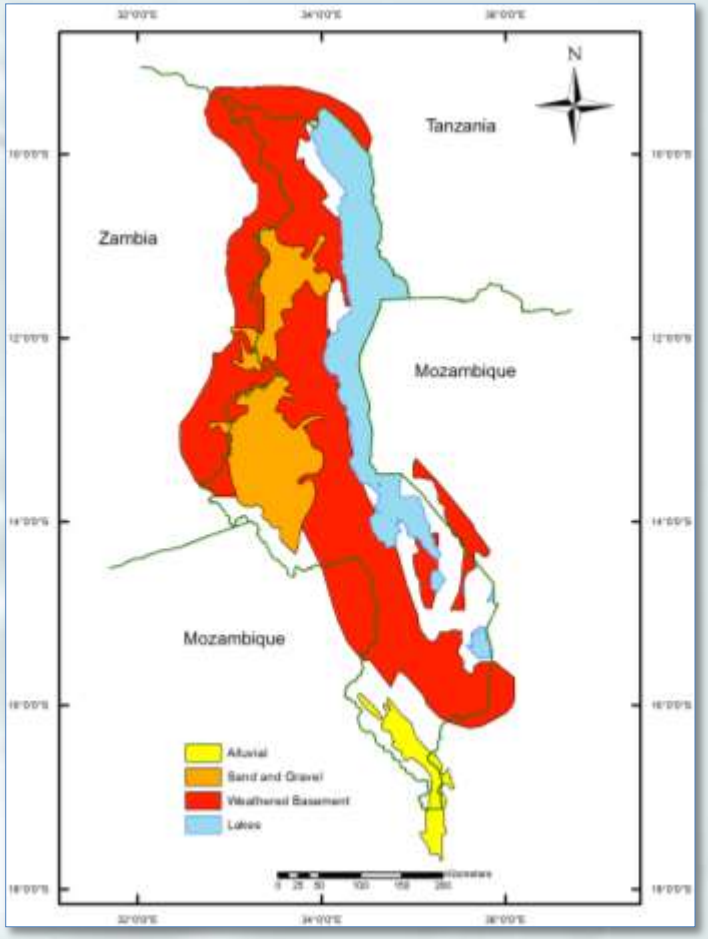
592 identified transboundary aquifers worldwide (IGRAC, 2015)

80 identified in Africa

3 described in Malawi in 'Transboundary Waters Assessment Program' regional report

- Weathered Basement Complex
- River Alluvium
- Sand and Gravel

Is this depth of knowledge appropriate for national management?



1. Defining TBA boundaries

Need for holistic confident hydrogeological knowledge and conceptualization of transboundary aquifer systems

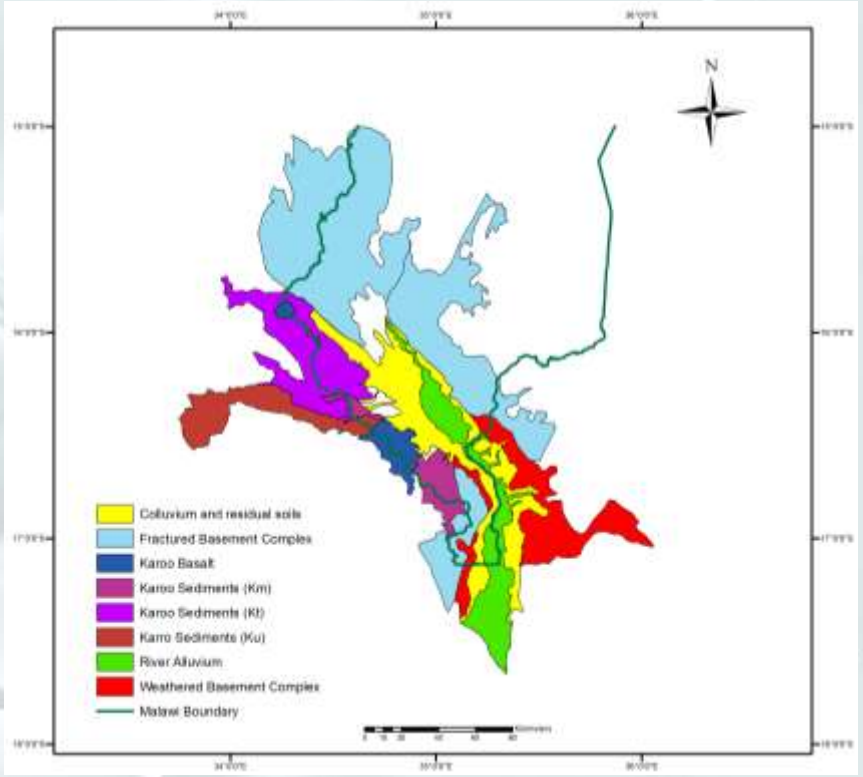
But how?

Case specific but In Malawi:

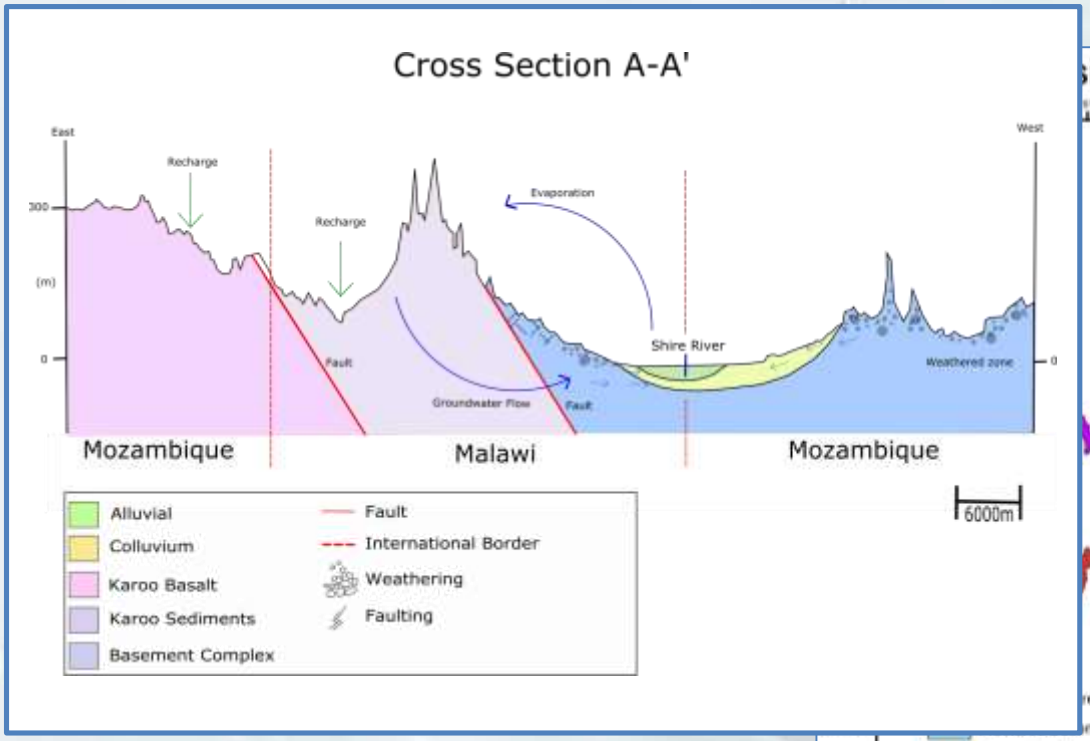
- Small scale aquifer identification

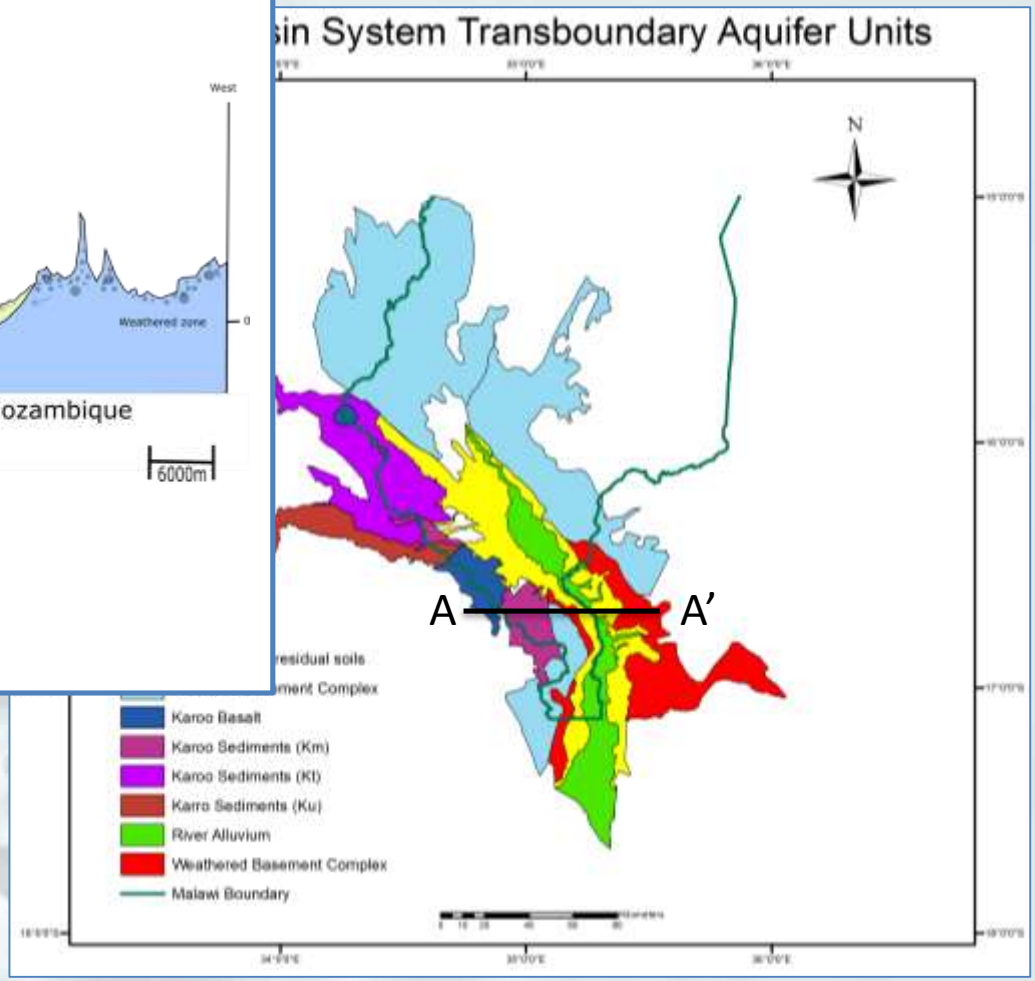
- Accounting for discontinuous nature of basement complex

- Accounting for fractured and weathered zones in basement complex

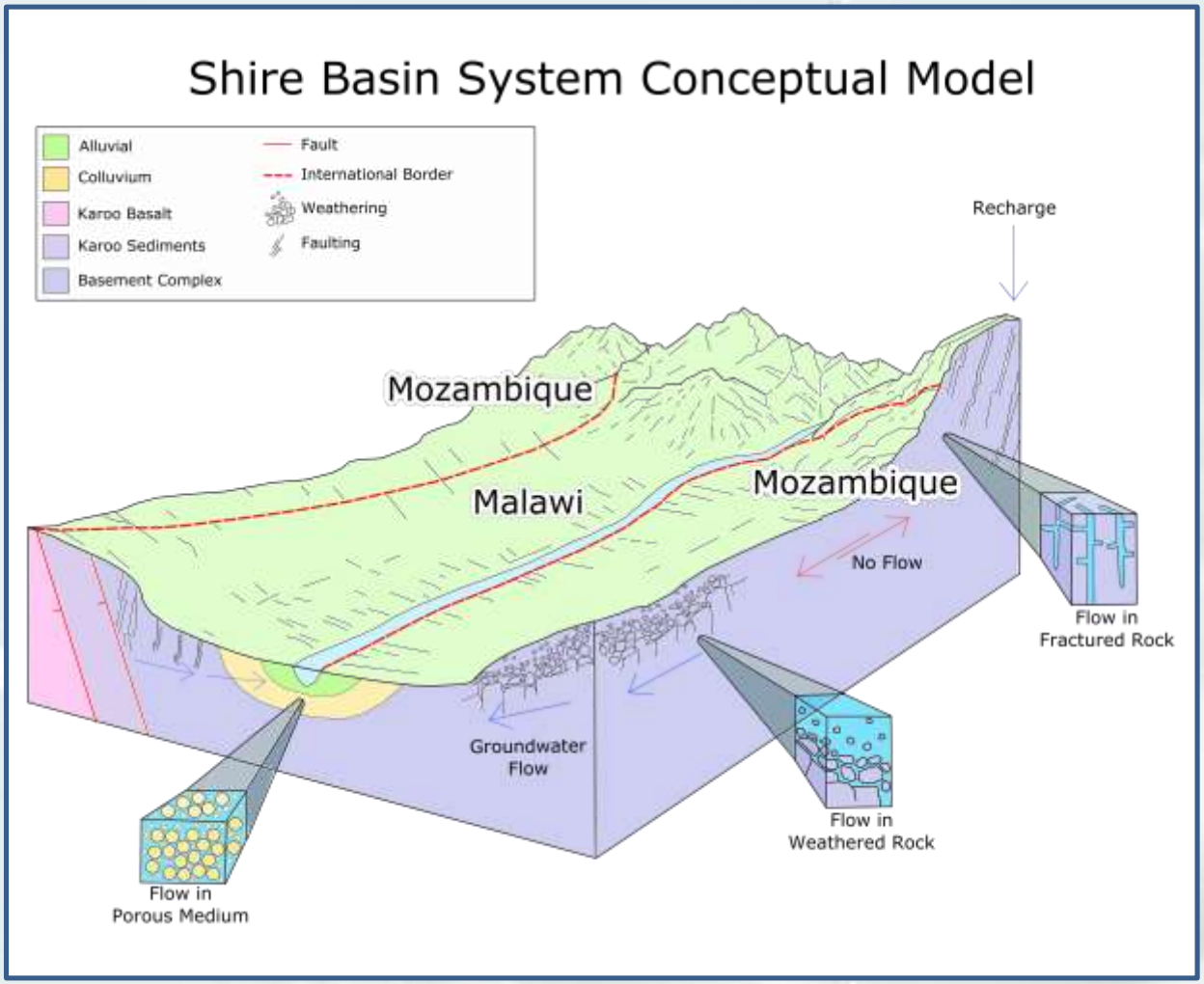


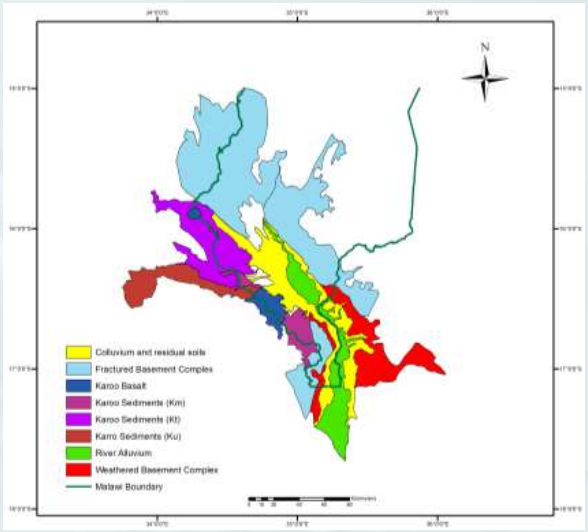
2. Determine Hydraulic Linkages





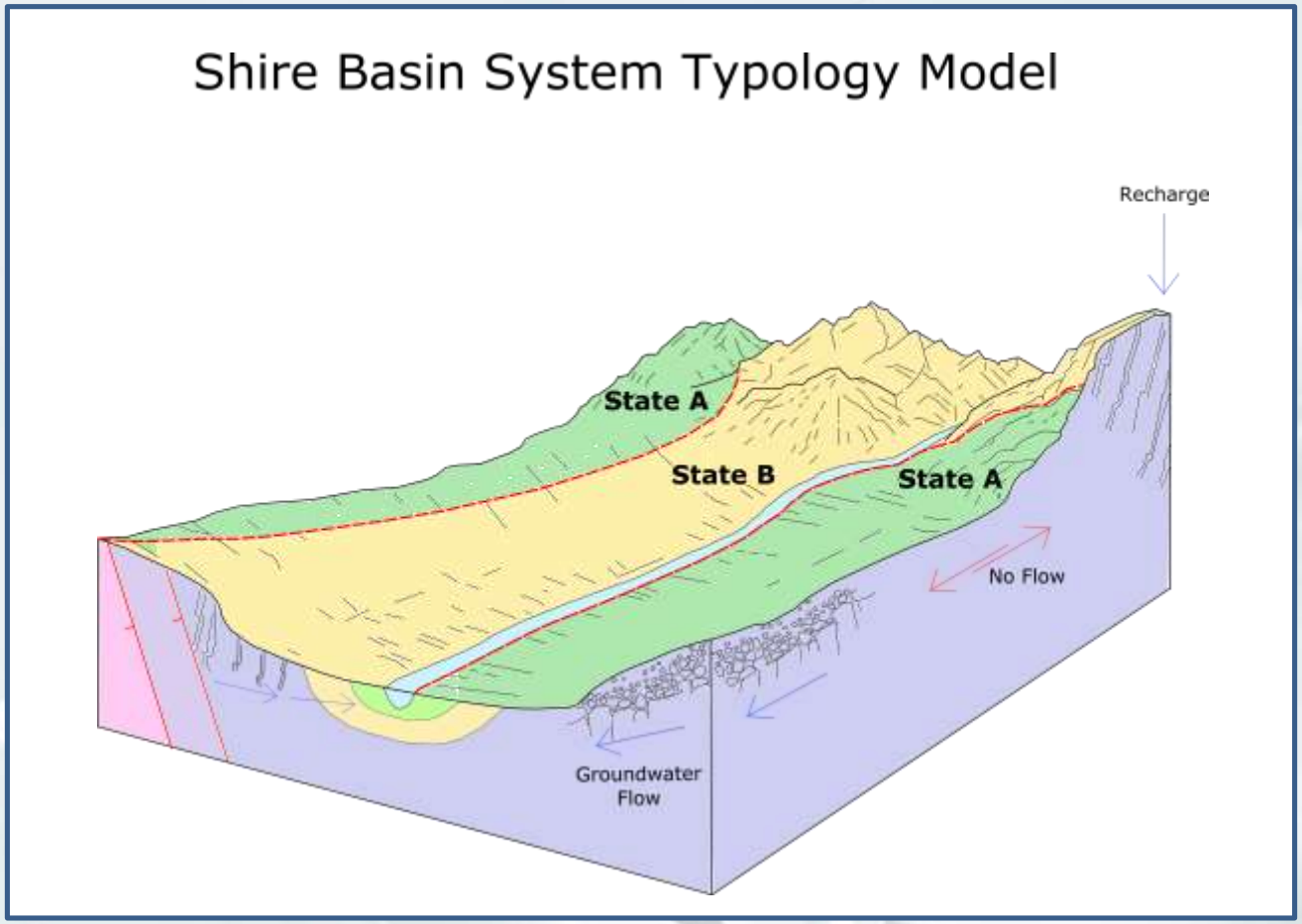
3. Portraying this as a System

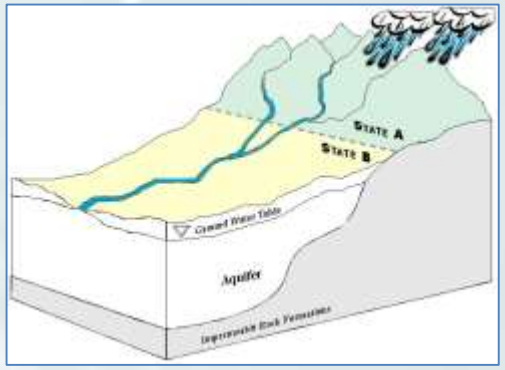


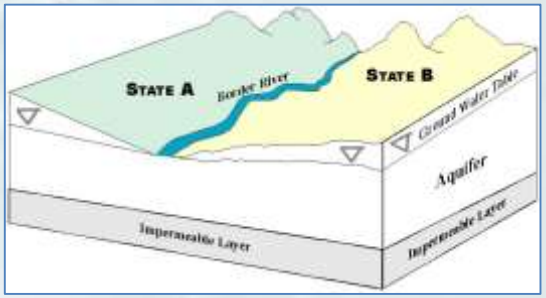


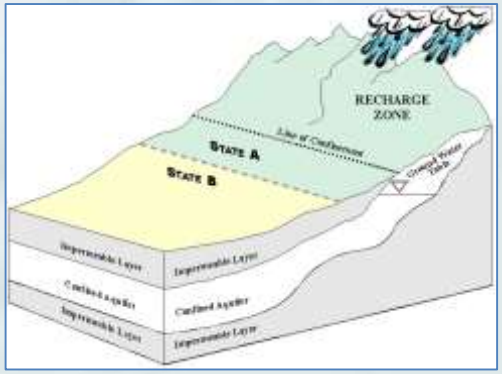
Shire River System Typology

University of Strathclyde Engineering





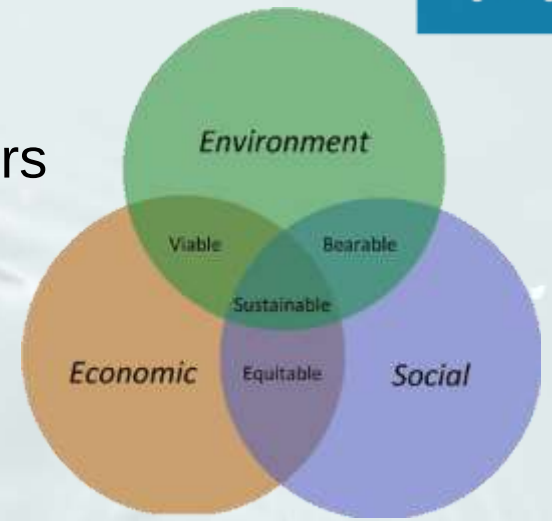




A tool to match typology to management practices

Economic, Environmental and Social factors

- 3 sustainability Pillars



High population reliance, thin aquifer = different management practices required compared to a low population, thick aquifer

Low recharge, high abstraction = different management practices required compared to a high recharge, low abstraction aquifer

High reliance for agriculture = different management practices required compared to an aquifer with low reliance for agriculture

Conclusions

There is a need for holistic confident hydrogeological knowledge and conceptualisation to inform transboundary aquifer policy. How can we do this?

- Ensure TBA assessments are accurately informed by sound hydrogeological science - In Malawi, this means the inclusion of small TBAs as well as considering the discontinuous and weathered nature of the basement complex

- Conceptualize transboundary aquifers as systems rather than units - Systems portray the hydraulic linkages, important for management

- Link systems to typology models and management practices – Eckstein (2005) a good place to start but this could be developed further

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