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Graph theoretical stable allocation as a tool for reproduction of control by human operators

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During the design of central control algorithms for existing water resource systems under manual control it is important to consider the interaction with parts of the system that remain under manual control and to compare the proposed new system with the existing manual methods. In graph theory the “stable allocation” problem has good solution algorithms and allows for formulation of flow distribution problems in terms of priorities.

As a test case for the use of this approach we used the algorithm to derive water allocation rules for the Gezira Scheme, an irrigation system located between the Blue and White Niles south of Khartoum. In 1925, Gezira started with 300,000 acres; currently it covers close to two million acres.