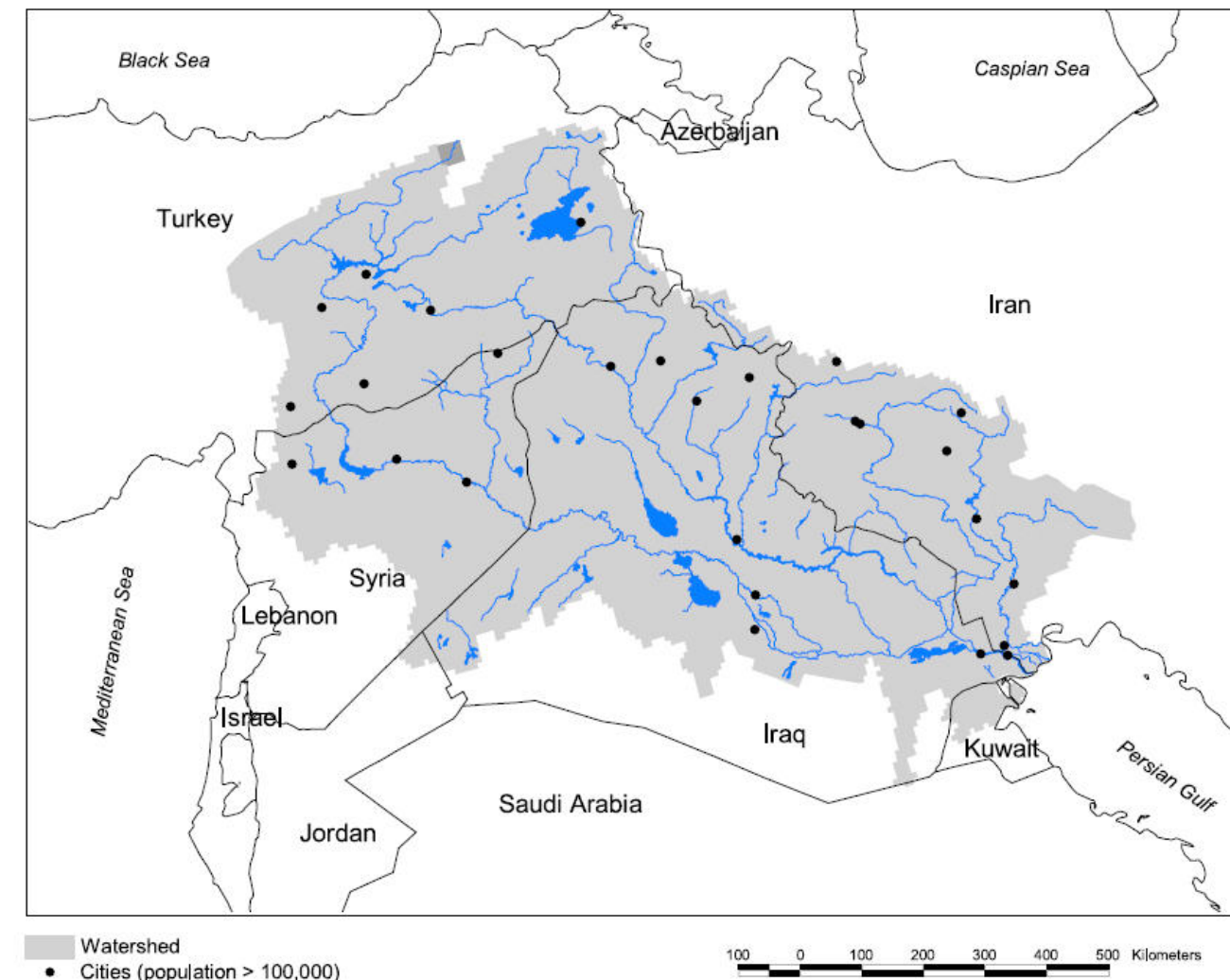


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Application of ArcGIS and ArcHydro Tools in the Euphrates-Tigris River Basin

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Methodology:

Download Digital Elevation Models, stream network and basin information

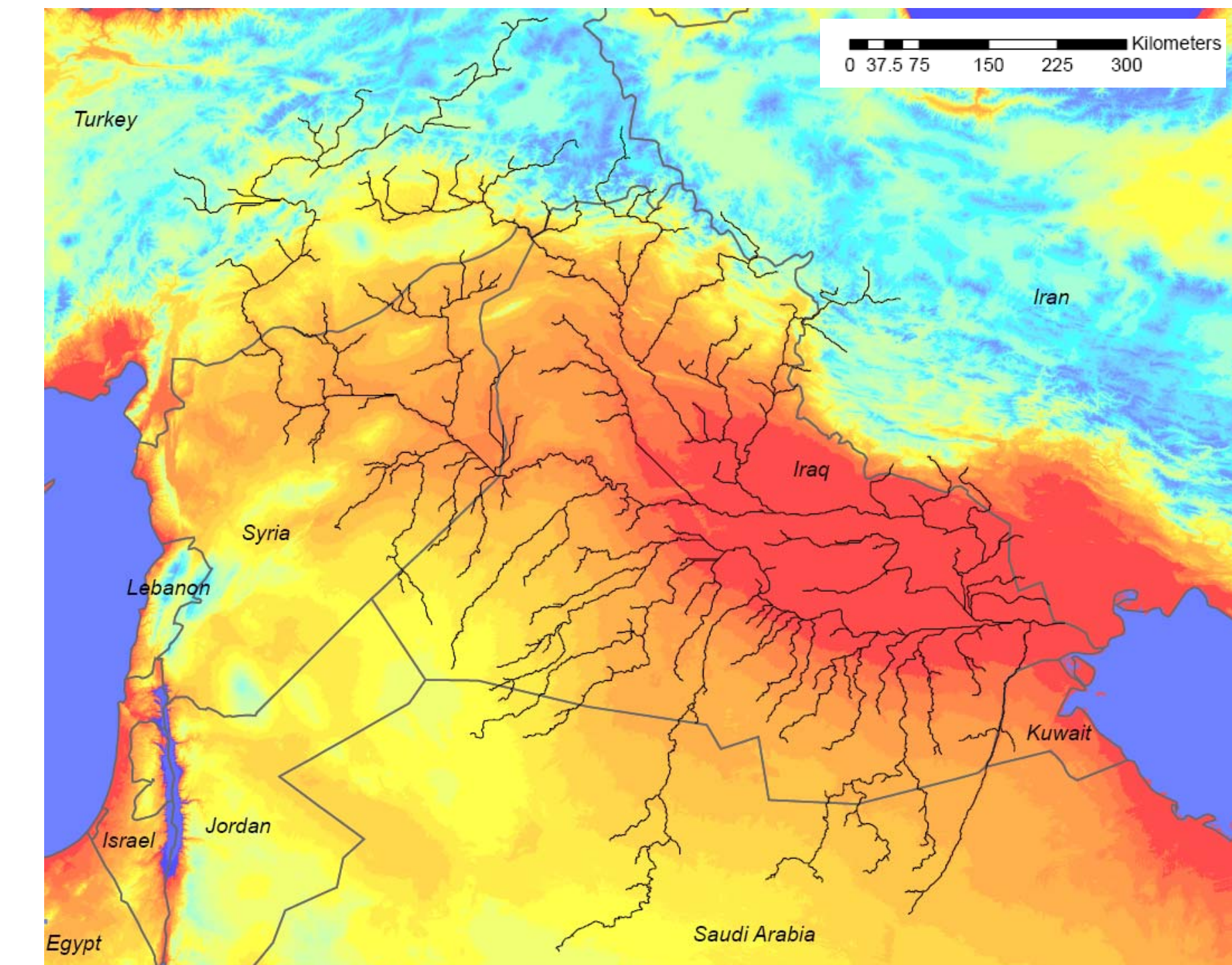
Process DEMs to obtain Flow Direction, Accumulation and Watershed Rasters

Determine stream network by flow tracing and obtain drainage basins

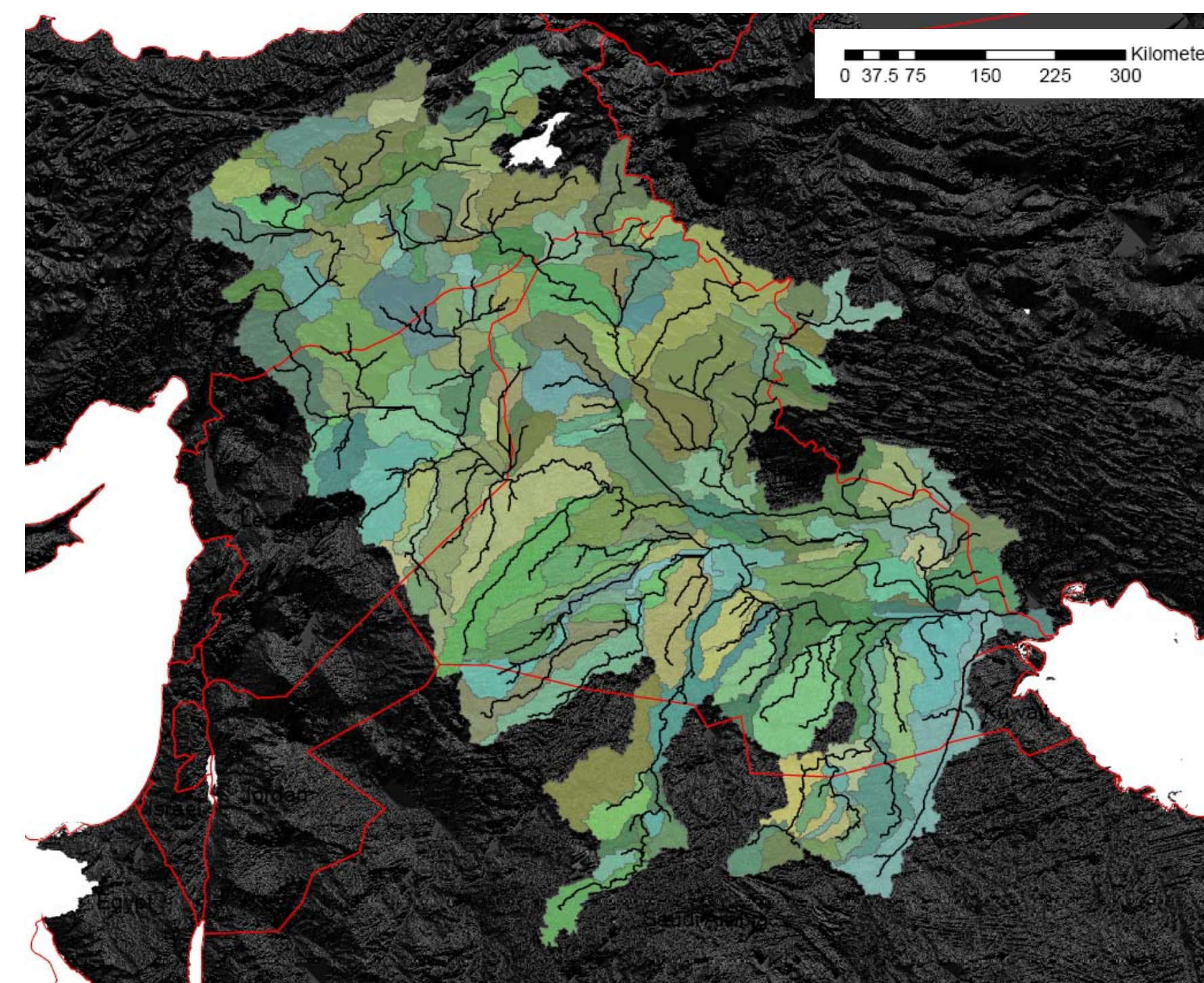
Check for errors and complete networks by adding new streams/basins

Assign HydrolIDs to drainage network and basins and process

Populate Hydrography database with additional data and time-series

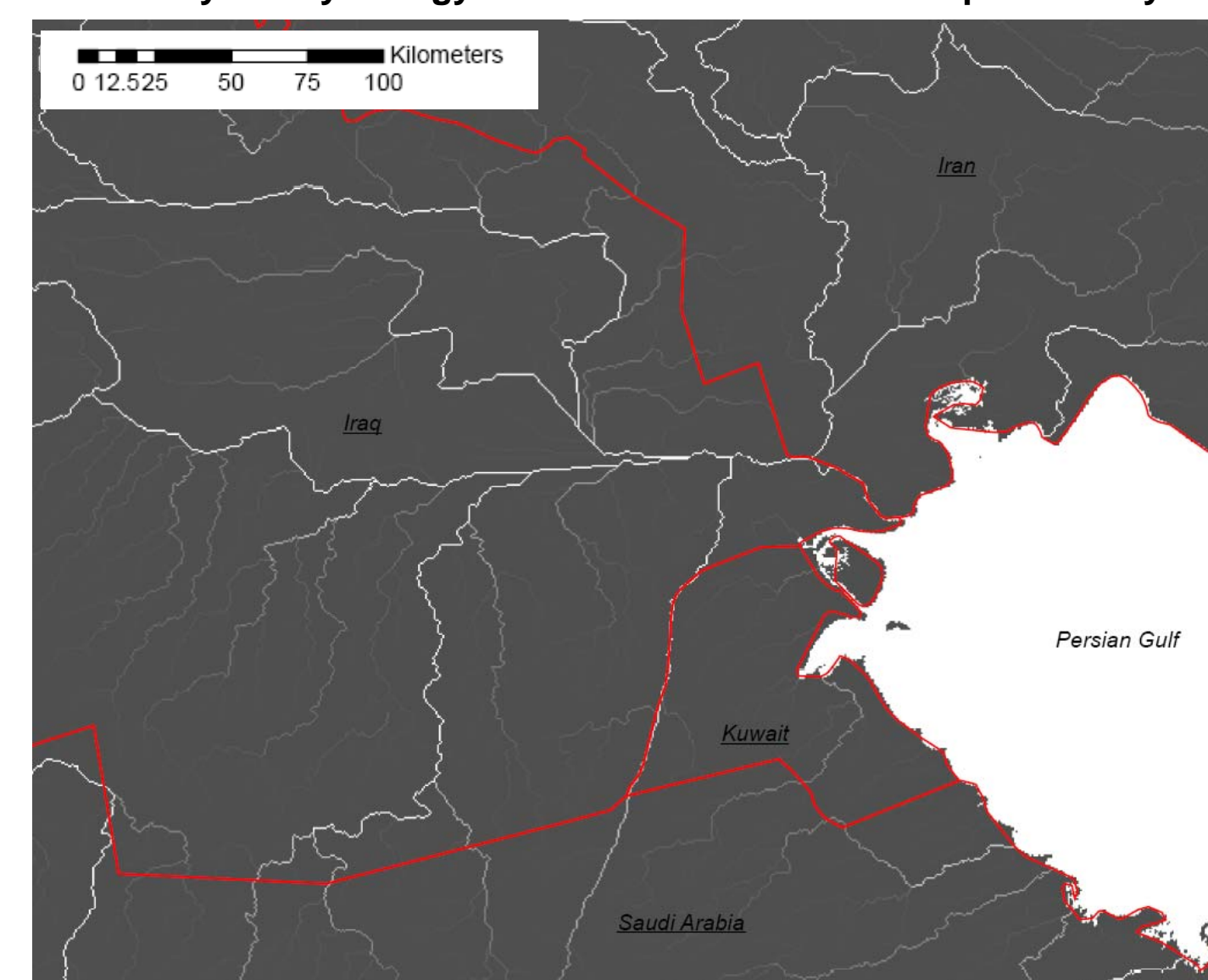


Tigris-Euphrates drainage network overlaid over Watershed raster (found using the Hydrology Watershed function of ArcGIS Spatial Analyst). A Watershed raster cell provides information on how many cells it drains from the network above (red being more cells upstream).



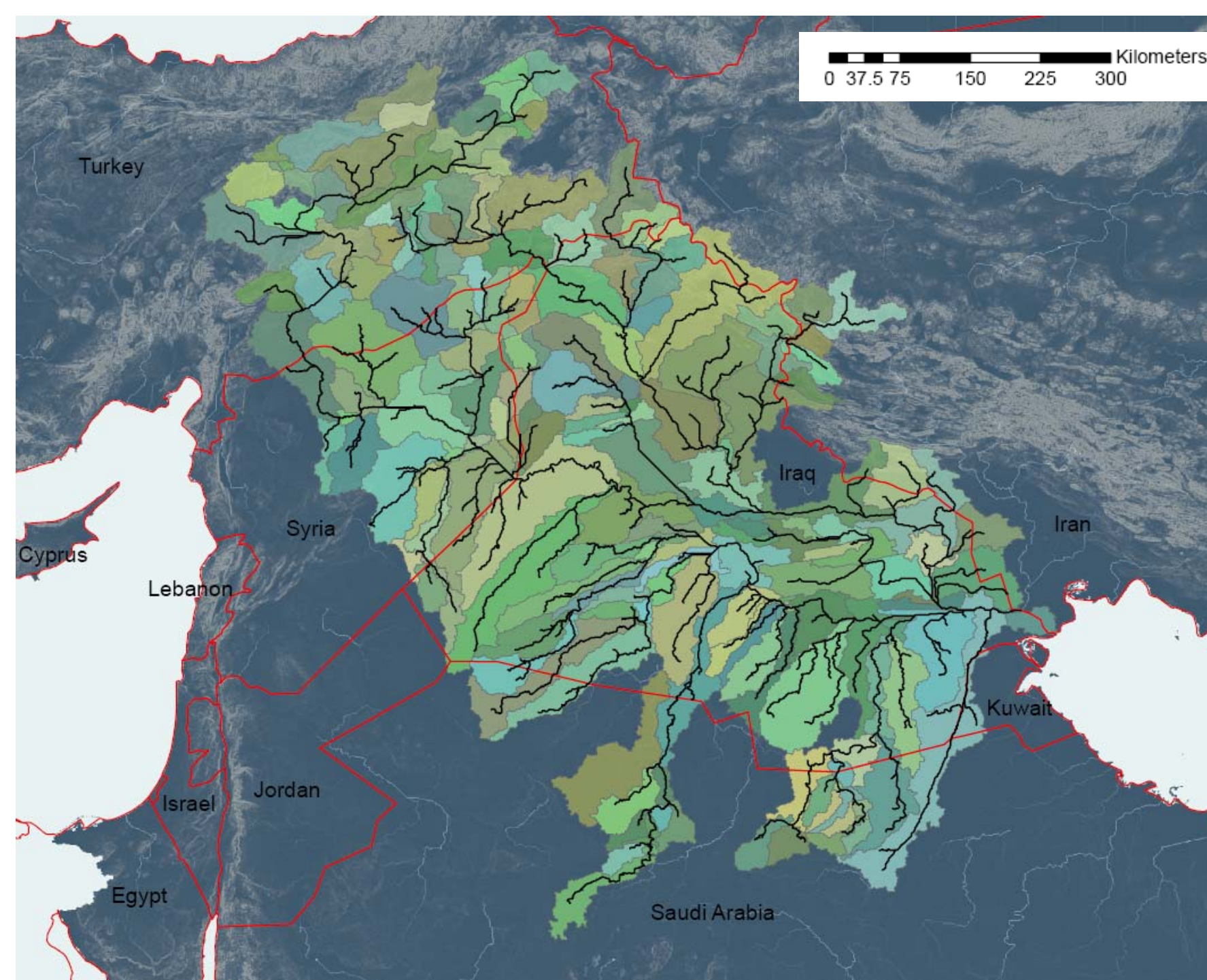
The Tigris-Euphrates drainage basin and network overlaid over the Flow Direction DEM. The stream networks shown were extracted from Hydro_1K Database by flow tracing upstream from mouth of the river.

The Euphrates-Tigris forming the Shatt-al-Arab estuary near the common border of Iraq, Iran, and Kuwait. The stream networks were derived by the Hydrology Flow Direction function of Spatial Analyst.



Overview of Project:

1. The Euphrates and the Tigris together form the largest river basin in the Middle-East, satisfying fresh water requirements of eastern Turkey, Syria, Iraq, and parts of southwestern Iran.
2. This is a highly contested river basin with no framework of cooperation and data exchange between the riparian countries.
3. This project is thus aimed at applying ArcGIS and ArcHydro tools to study the river basin and establish a Geodatabase to facilitate hydrologic analysis using freely available GIS data.



The Tigris-Euphrates drainage basin and network were identified from the Hydro_1K Data by isolating the uninterrupted flow network and selecting associated drainage basin polygons. Shown on top of USGS DEM.

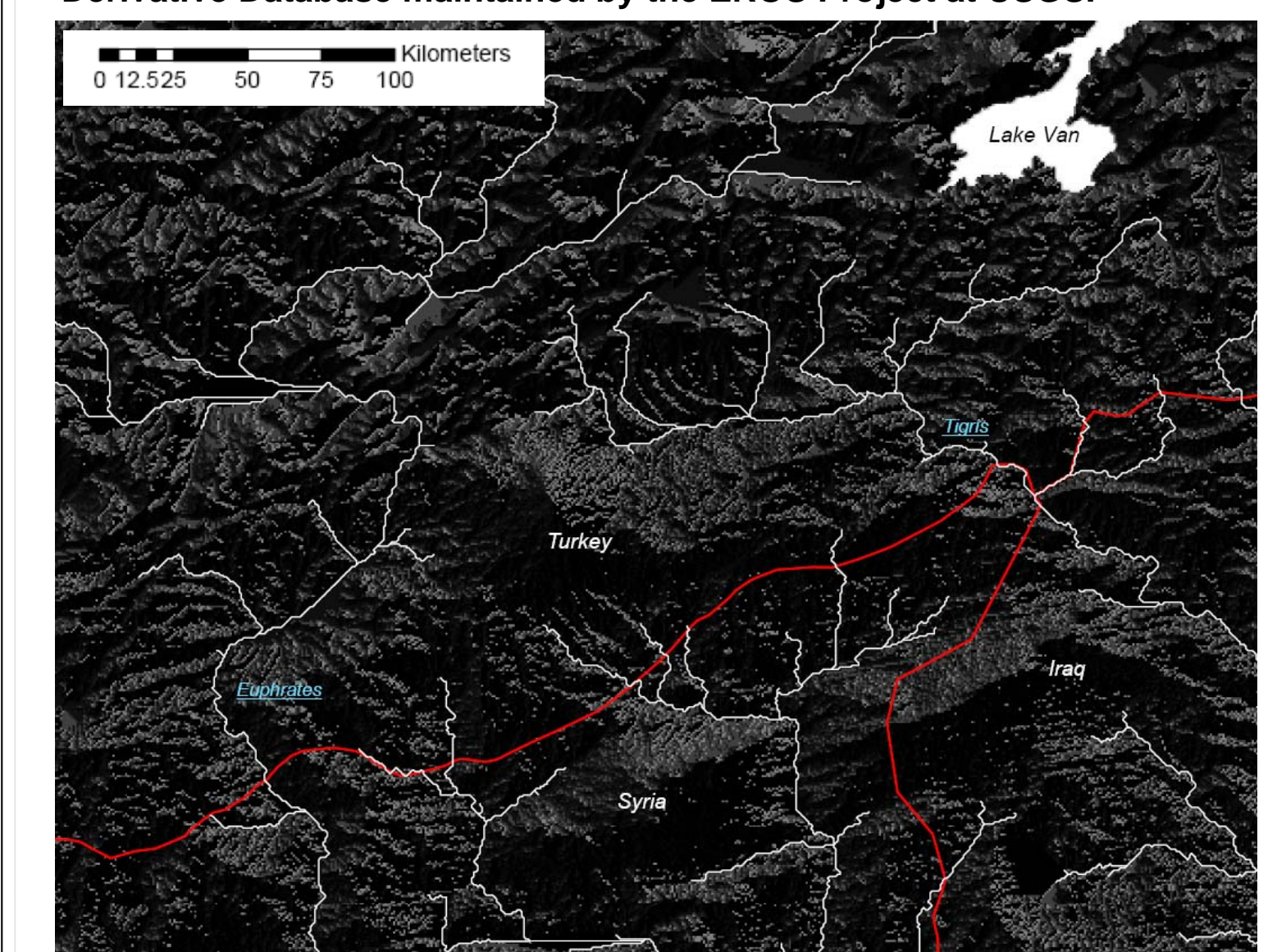
Data Sources:

1. Hydro 1K Elevation Derivate Database, Earth Resources Observation Systems (EROS) Data Center, United States Geological Survey (USGS), SD, USA.
2. GIS Data Depot, Geo Community, <http://www.geocomm.com>
3. Global Runoff Data Center (GRDC), Federal Institute of Hydrology, Germany

Components of ArcGIS & ArcHydro Database:

1. Hydrography database with various streamflow monitoring points, dam/reservoir locations, and water diversion data for irrigation, municipal etc.
2. Streamflow Network with seasonal flow information.
3. Depository of available Digital Elevation Models and Raster format files.
4. Layers depicting various Drainage polygons and watersheds of the basin.

Highlands of South Eastern Turkey - both the Euphrates and the Tigris originate here within 30 kilometers of each other, but they travel more than 1500 kilometers before they come together again. The backdrop in this image is the Flow Direction file processed from the DEM. The stream networks shown were obtained from the Hydro_1K Elevation Derivate Database maintained by the EROS Project at USGS.



Work in Progress:

1. Establishing Hydrography database for this river basin network with streamflow monitoring points, reservoirs, and different water diversion projects - irrigation, municipal etc.
2. Data quality improvement—inclusion of more streams to the network based on satellite and additional available data.