



Australian Academy of Science

Ian Potter House, Gordon Street, Canberra ACT 2601

Geographic Information Systems (GIS) coverage of the Murray-Darling Basin

The question put to the Academy was whether we are aware of knowledge gaps in GIS coverage of the Murray-Darling Basin. This response is based on consultation with Professor Graciela Metternicht, a leading GIS researcher and Deputy Chair of the National Committee for Geographical Sciences.

The Terrestrial Ecosystem Research Network (TERN) maintains active coverage of Australian earth observations with multiple layers of information. The TERN Landscapes initiative (formerly AUSCover) provides datasets from MODIS (250m resolution) and Landsat (30m resolution) of vegetation cover fraction, including time series studies.

Example TERN datasets:

Fractional land cover at 30m spatial resolution, 2010-11 (Landsat):

<http://data.auscover.org.au/xwiki/bin/view/Product+pages/Landsat+Fractional+Cover>

Vegetation cover fraction at 250 m, every 16 days (MODIS):

<http://data.auscover.org.au/xwiki/bin/view/Product+pages/LPDAAC+Mosaics+MOD13Q1+CMAR>

Australian woody vegetation cover at 30 m, 2000-2010 (Landsat):

<http://data.auscover.org.au/xwiki/bin/view/Product+pages/Persistent+Green-Vegetation+Fraction>

Australia's environment explorer:

http://wenfo.org/ausenv/#/2016/Exposed_soil/Grid/Actual/States_and%20Territories/bar,options/-28.96/135.00/5/none/Roadmap/Opaque

In 2017, Geoscience Australia recently published the Murray-Darling Basin Vegetation Monitoring Project Final Report, including satellite data and related scientific services to support the MDBA's monitoring of riparian vegetation responses to changing river conditions. The work incorporates an automated processing chain for Landsat satellite images from Geoscience Australia's archive into customised high level intermediate products, and ultimately into statistics on vegetation condition and related data.

<https://data.gov.au/dataset/murray-darling-basin-vegetation-monitoring-project-final-report>



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The Murray-Darling Basin Authority maintains maps and spatial data to support their policies and programs, including data on hydrology, biota, terrain, vegetation, geology and built and natural assets.

<https://www.mdba.gov.au/publications/maps-spatial-data>

Each state maintains its own GIS and remote sensing data sets, with up-to-date maps and data resources:

New South Wales: <https://sdi.nsw.gov.au/nswsdi/catalog/main/home.page>

Victoria: <https://www.data.vic.gov.au/data/group/spatial-data>

Queensland: <http://qldspatial.information.qld.gov.au/catalogue/custom/index.page>

South Australia: <https://www.environment.sa.gov.au/Science/mapland/spatial-gis-data>

Dr Mirela Tulbure of the University of New South Wales has led research using compilations of 25 years of Landsat data:

Heimhuber, Valentin, Mirela G. Tulbure, and Mark Broich. "*Modeling 25 years of spatio-temporal surface water and inundation dynamics on large river basin scale using time series of Earth observation data.*" *Hydrology and Earth System Sciences* 20, no. 6 (2016): 2227.

Tulbure, Mirela G., Mark Broich, Stephen V. Stehman, and Anil Kommareddy. "*Surface water extent dynamics from three decades of seasonally continuous Landsat time series at subcontinental scale in a semi-arid region.*" *Remote Sensing of Environment* 178 (2016): 142-157.

Bishop-Taylor, Robbi, Mirela G. Tulbure, and Mark Broich. "*Evaluating static and dynamic landscape connectivity modelling using a 25-year remote sensing time series.*" *Landscape Ecology* 33, no. 4 (2018): 625-640.

In 2013 the CRC for Spatial Information published the report *A Synthesis of Remote Sensing Capabilities with Specific Reference to the Business Needs of the Murray Darling Basin Authority*. This report considered the current and future potential of remote sensing and related capabilities to contribute to the key business and information needs of the Murray Darling Basin Authority. The report provides a then-current audit of available remote sensing capabilities relevant to the Murray-Darling Basin, and made recommendations as to how they could be best applied.

<http://www.crcsi.com.au/assets/Resources/2be1e08c-7bb2-4f0e-9482-e902839712b8.pdf>



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From this information, the Academy concludes that GIS coverage of the Murray-Darling Basin is strong. While it is important that our remote sensing and earth observation capabilities be maintained and improved, there are no obvious gaps in the GIS coverage of the Murray Darling Basin. These datasets are available to be interrogated at the direction of policymakers.