

Water in the South-East Gulf region

Water for a Healthy Country Flagship

National Research
FLAGSHIPS
Water for a Healthy Country



The CSIRO Northern Australia Sustainable Yields Project provides science to underpin the sustainable planning and management of the water resources of northern Australia

Project overview

Led by CSIRO's Water for a Healthy Country Flagship, the Northern Australia Sustainable Yields Project is the nation's most comprehensive assessment of water availability in northern Australia. From Broome in Western Australia to Cairns in Queensland, this project provides critical information on current and likely future water availability for the 13 regions of northern Australia, an area renowned for its high rainfall, pristine tropical environments and relatively low level of development. This information will help governments, industry and communities consider the environmental, social and economic aspects of the sustainable use and management of the water assets of the north.

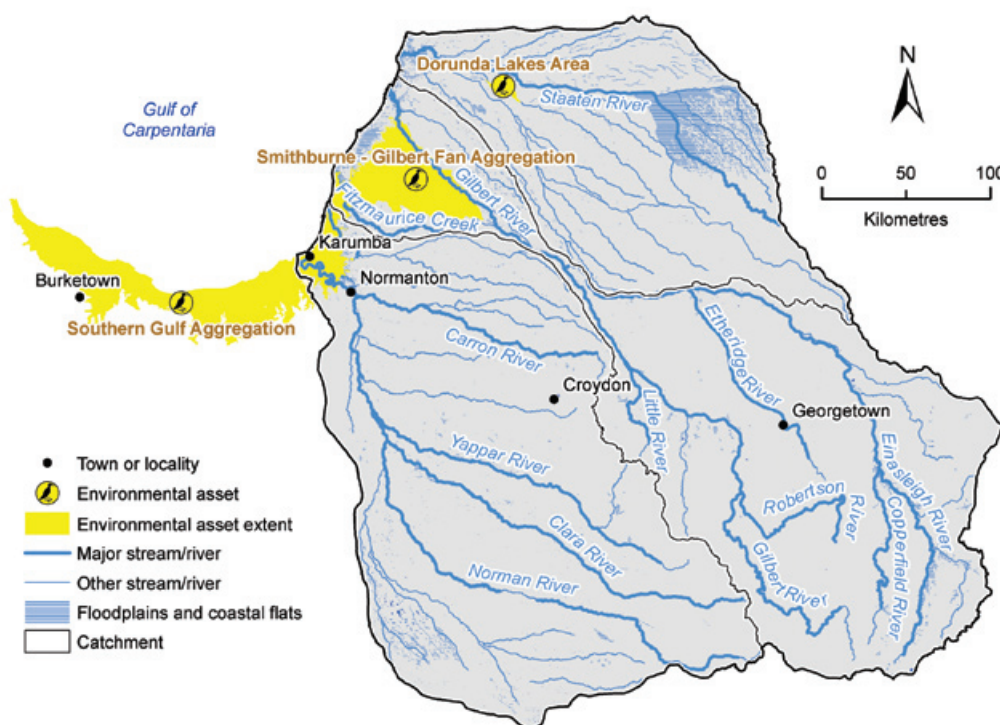


The region

The South-East Gulf region covers 122,000 km² and comprises the Australian Water Resource Council river basins of the Staaten, Gilbert and Norman rivers. These rise in the Great Dividing Range, flow in a generally north-west direction to the coast, then spread out into extensive floodplains and deltas running north of Karumba. There is considerable interconnection between streams in this region, hence high flow leads to severe flooding.

The Staaten River is declared as a Wild River and will be maintained in its near-pristine condition. In addition to the river systems itself, the wild river area has the nationally significant Dorunda Lakes wetland area.

The Smithburne–Gilbert Fan Aggregation contains the greatest concentration of coastal floodplain lagoonal wetlands in the western Cape York Peninsula, providing important dry season habitat for many birds.



> The South-East Gulf region

The vast majority of the region remains uncleared and is considered an isolated area with little or no development. Grazing remains the major industry. The population is estimated at less than 3000.

Historical and recent climate

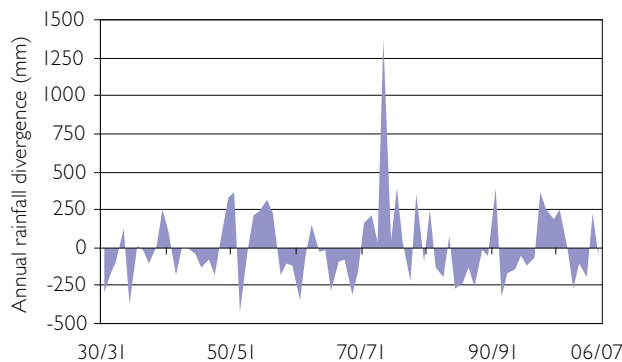
The South-East Gulf region has a very high inter-annual variability in rainfall and hence surface water runoff and groundwater recharge. Coefficients of variation are among the highest of the regions across northern Australia and reflect multiple years of significantly below and above average rainfall.

There is a strong seasonality in rainfall patterns, with 95 percent of rain falling between November and May, and a very high dry season potential evapotranspiration. The region has a relatively high rainfall intensity, and hence rapid runoff and short lag between rainfall and runoff with a slightly increasing amount and intensity of rainfall from 1930 to 2007.

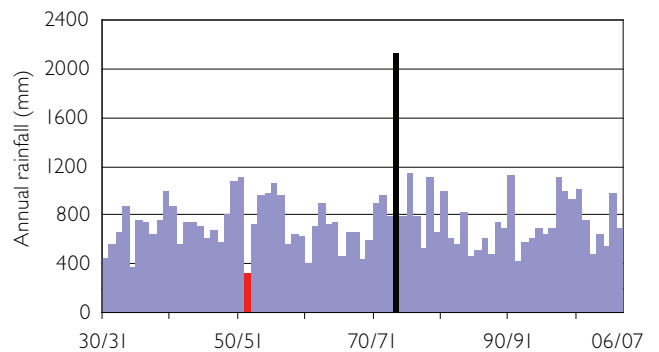
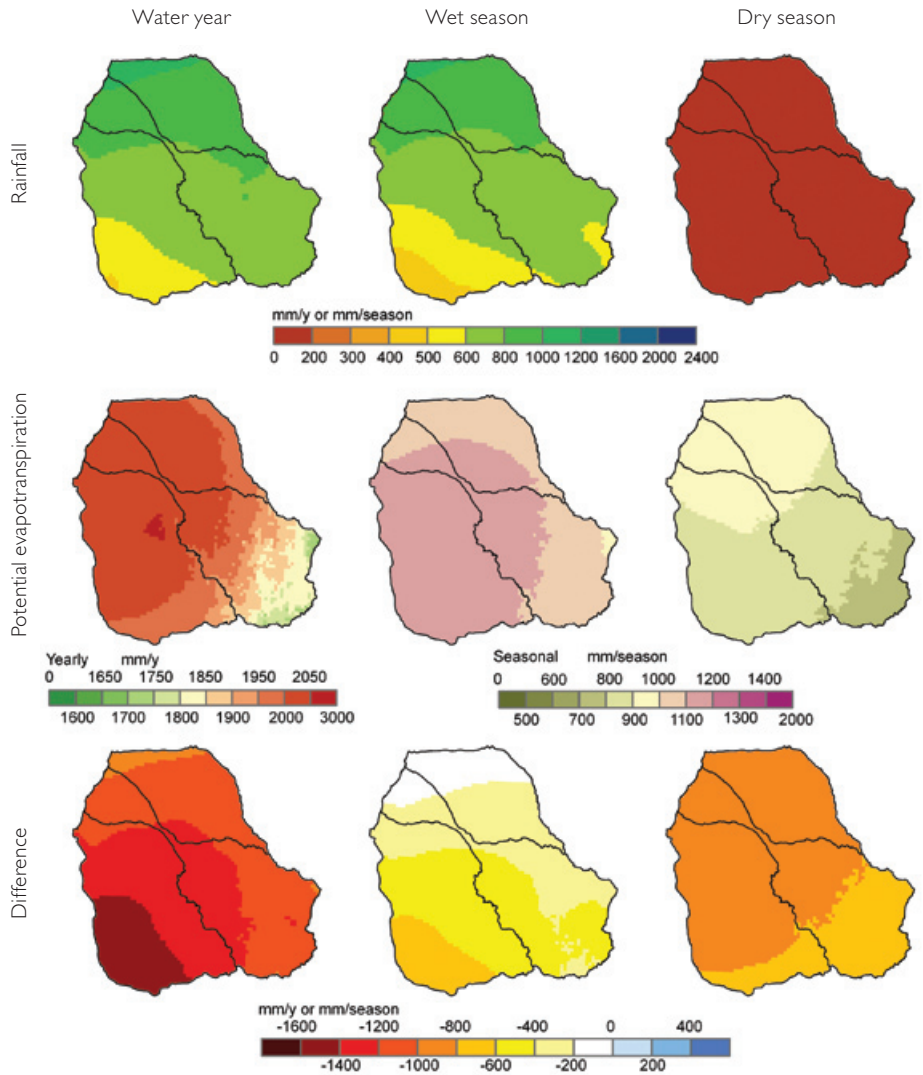
> Distribution of historical mean annual (water year), wet season and dry season rainfall and potential evapotranspiration and their difference (the annual rainfall deficit). Water year – September to August; wet season – November to April; dry season – May to October

> Historical mean annual rainfall, potential evapotranspiration and modelled runoff

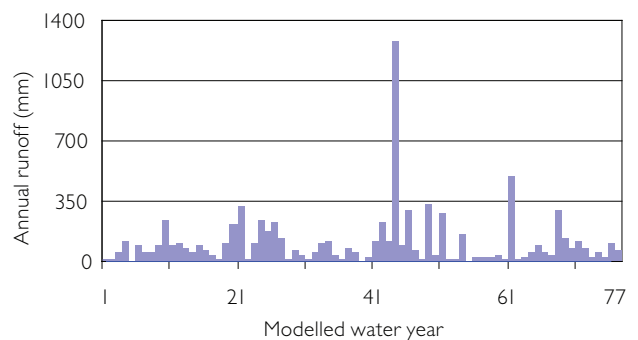
Rainfall	750 mm
Potential evapotranspiration	1980 mm
Runoff	113 mm (15 % of rainfall)



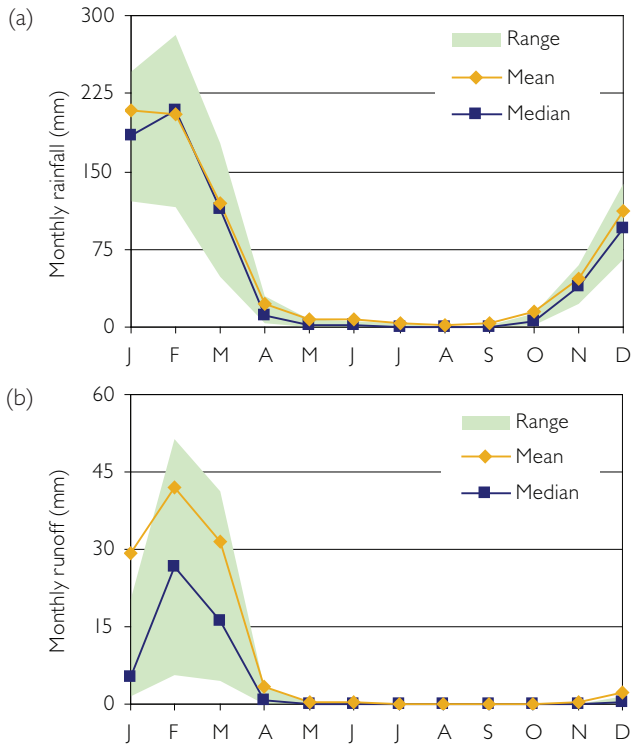
> Divergence of historical annual rainfall from the long-term mean (1930 to 2007)



> Historical annual rainfall (1930 to 2007)



> Modelled annual runoff



The historical (1930 to 2007) mean annual rainfall for the region is 750 mm. Mean annual potential evapotranspiration is 1980 mm. Annually, potential evapotranspiration is generally greater than rainfall and thus the region is annually water-limited; in other words there is more energy available to remove water than there is water available to be removed.

The South-East Gulf region has a recent (1996 to 2007) climate record that is statistically significantly similar to the historical (1930 to 2007) record.

> Historical monthly (a) rainfall and (b) runoff (Range is the 25th to 75th percentile monthly rainfall or runoff)

Historical and current water resources

There is a strong north-south rainfall gradient and between 10 and 30 percent of rainfall flows as runoff.

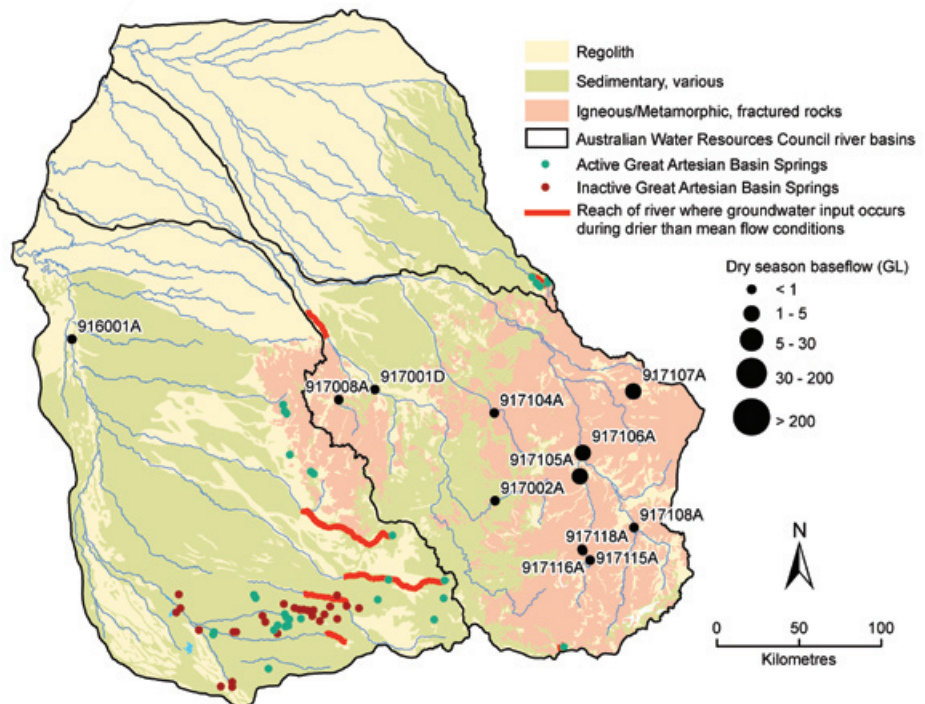
The mean annual runoff averaged over the modelled area of the South-East Gulf region is 113 mm, 15 percent of rainfall. Compared to other regions, average rainfall is low and potential evapotranspiration is high. Under the historical climate the mean annual streamflow over the South-East Gulf region is estimated to be 14,430 GL.

There is a river systems model for the upstream area of the Gilbert River. Current average surface water availability in this system is 3724 GL/year and on average about 29 GL/year (or less than 1 percent) is used. This is a very low level of use.

Deep aquifers contain the largest storage of water. The Gilbert River Formation of the Great Artesian Basin is the main groundwater resource in the region. This is predominantly a confined aquifer, but is found in rock outcrop to the south and east where it provides baseflow to the Norman River and is likely responsible for extending the duration of its flow

into the dry season. The Gilbert River Formation and Eulo Queen Group aquifers also provide groundwater discharge to the Gilbert River, Yappar River, Clara River and Boorabin Creek, allowing surface water flows in these rivers to be maintained well into the dry season.

The Great Artesian Basin springs discharging in the region provide an important source of water. The shallow alluvial aquifers are characterised by variable thickness and groundwater quality and are therefore a relatively undeveloped groundwater resource.



> Surface geology of the South-East Gulf region showing location of spring groups, historical mean dry season baseflow at selected streamflow gauging stations and reaches of river that remain perennial under drier than average conditions

What the future holds

The future (~2030) climate was modelled and the range of future climate series ranked. The 'median future climate' represents the mid-range conditions. The 'wet extreme future climate' represents the wet end of the range and the 'dry extreme future climate' represents the dry end of the range.

Modelling suggests that future (~2030) rainfall conditions will be similar to historical conditions, and future runoff and recharge will also be similar to historical levels. Potential for evaporation, however, is expected to increase.

There are few opportunities for surface water storage and most are in the southern, drier headwater areas where potential evapotranspiration is highest within the region. Lower reaches are frequently flooded because the landscape is mostly flat.

None of the environmental assets in this region have adequate data by which to gauge the potential impacts of future climate change and development or to assess changes to flow regime at these assets.

The region is generally data-poor. The region is relatively isolated with little development. There is minor demand for water largely owing to the small population.



> Morning glory roll cloud, Gulf of Carpentaria, from 8000 ft, north-east Queensland.
Courtesy of Russell White, Sydney NSW © 2000

For further information:

Water for a Healthy Country Flagship

Project Leader
Dr Richard Cresswell
Phone: 07 3214 2767
Email: Richard.Cresswell@csiro.au
Web: www.csiro.au/partnerships/NASY

Northern Australia Water Futures Assessment

Department of the Environment, Water,
Heritage and the Arts
Phone: 02 6274 1111
Email: northern.assessment@environment.gov.au
Web: <http://www.environment.gov.au/nawfa>

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Contact Us

Phone: 1300 363 400
+61 3 9545 2176

Email: enquiries@csiro.au
Web: www.csiro.au/flagships



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