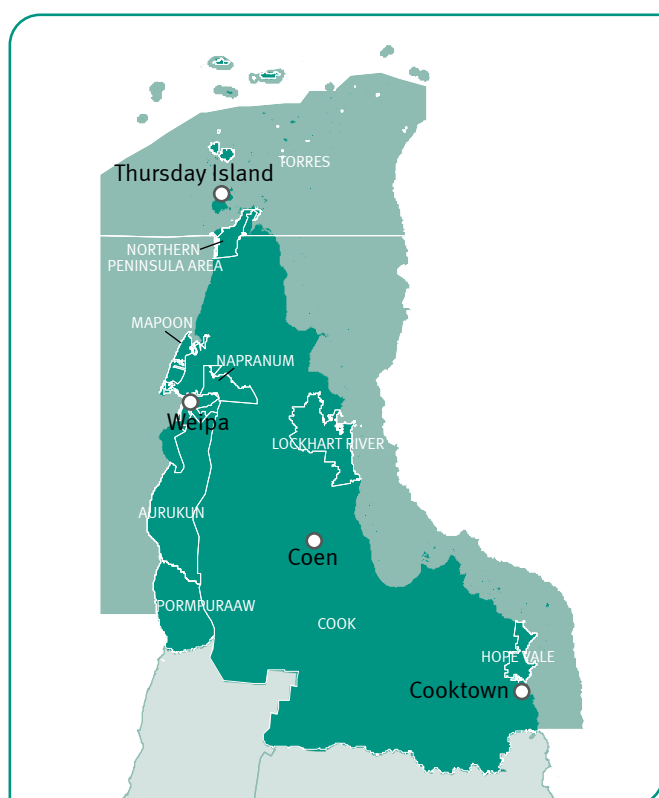


# Climate change in the Cape York region

VERSION 1



UNDERSTAND | ADAPT



## Cape York region snapshot

Cape York is a sparsely populated region encompassing the Torres Strait Islands and the towns of Weipa, Cooktown and Palmerville. It is bounded by the Gulf of Carpentaria to the west, the Torres Strait to the north and the Coral Sea to the east. The region occupies around 7% of the state's total area, but has only 0.4% of the state's population.

## How will climate change affect the Cape York region?

In the future, the region can expect:



higher temperatures



rising sea level



hotter and more frequent hot days



more frequent sea-level extremes



more intense downpours



warmer and more acidic seas



less frequent but more intense tropical cyclones

## How can we deal with these changes?

Queensland often experiences climate extremes such as floods, droughts, heatwaves and bushfires. Climate change is likely to exacerbate the frequency and severity of these events. We will increasingly be affected by changes in temperature, rainfall, sea level and extreme weather conditions.

It makes sense to take appropriate action to better manage our climate risks. Well-considered and effective adaptation measures can limit the adverse impacts of climate change on communities, the economy and natural systems. We can achieve more if we act together to plan for and manage current and future climate impacts across different sectors and regions.

The Queensland Government is working with a range of stakeholders, using the best available science to address the risks climate change presents to our economy, environment, infrastructure and communities. This publication presents details of the expected changes to temperature, rainfall and the sea. It highlights the likely impacts on people, businesses and the environment and presents ways to respond. For more information on climate change in Queensland, visit [www.qld.gov.au/environment/climate/climate-change/resources/science](http://www.qld.gov.au/environment/climate/climate-change/resources/science).



# Looking to the future

## Our current climate

The Cape York region has a tropical climate with high to very high temperatures experienced throughout the year. The average annual temperature is 26°C. The December to February average temperature is 28°C; for July to August, the average is 23°C.

Annual and seasonal average rainfall are variable, affected by local factors such as topography and vegetation, and broader scale weather patterns such as the El Niño–Southern Oscillation.

Annual average rainfall is 1305mm. The rainfall is highly seasonal, with most rain falling during the wet season (October–March) either as heavy thunderstorms, monsoonal lows or tropical cyclones.

The region's annual average potential evaporation is almost 50% greater than the annual average rainfall, which contributes to the depletion of soil moisture.

However, the climate is changing across Queensland.

Average temperatures across the state are currently 1°C higher than they were 100 years ago. Recent decades have shown a clear warming trend. Our climate is already highly variable but climate change is leading to shifts beyond this natural variability.

## Our future climate

Our climate is changing primarily because increasing amounts of greenhouse gases in the atmosphere are trapping heat, warming the air and oceans.

To determine what our future climate might be, scientists use global climate models to simulate the Earth's climate system. The models use a set of mathematical formulae that describe the physical processes of the atmosphere, ocean, land and ice.

Population, the economy, policy decisions and technology will all affect future emissions of greenhouse gases. We don't know exactly what these effects will be, so to cover a range of possibilities, scientists use emissions scenarios called representative concentration pathways (RCPs) to develop climate projections. These projections describe a lower emissions future, where greenhouse gas emissions are substantially reduced (using a scenario termed RCP4.5), and a high emissions future, where high levels of greenhouse gas emissions are set to continue (using a scenario termed RCP8.5).

The projections in this summary are given for 20-year periods centred on 2030 and 2070. The 2030 high and low emissions scenarios are so similar that only the high emissions scenario has been used in this publication. Projections are represented as a change relative to the average for the period 1986–2005.

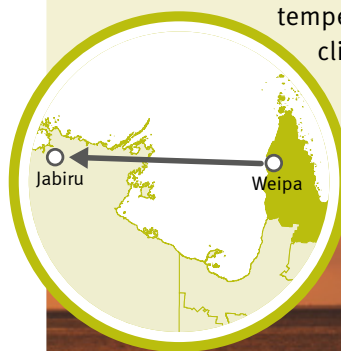
For example, in 2070 under a high emissions scenario, temperature in the Cape York region is projected to rise by 2.2°C (1.8 to 3.3°C). In this case, the middle temperature rise determined by all the models is 2.2°C. The range is between 1.8°C and 3.3°C, meaning 95% of model results indicated a rise of at least 1.8°C and 95% of the model results indicated a rise of 3.3°C or less.

The Queensland Climate Transition Strategy outlines how we will transition to a zero net emissions future that supports jobs, industries, communities and the environment. Find the strategy at [www.qld.gov.au/environment/climate/climate-change/response](http://www.qld.gov.au/environment/climate/climate-change/response).

### Weipa 2030

In 2030, under a high emissions scenario, the climate of Weipa will be more like the current climate of Jabiru.

To find out what the future climate will be like where you live, use the climate analogues tool on the Climate Change in Australia website at [www.climatechangeinaustralia.gov.au](http://www.climatechangeinaustralia.gov.au). The tool matches projected rainfall and maximum temperature with the current climate experienced in another location for the years 2030, 2050 and 2090.



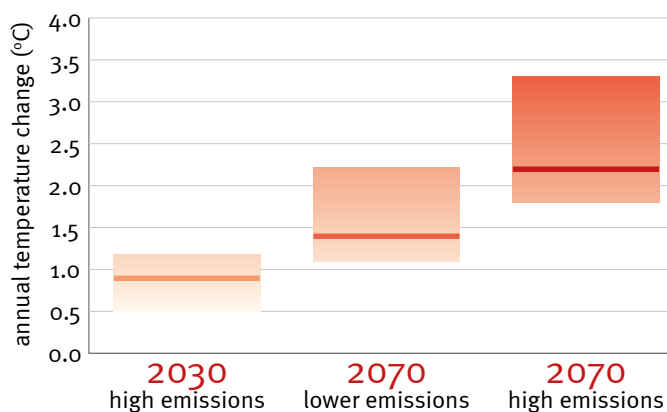
# Climate projections for Cape York



## Higher temperatures

Maximum, minimum and average temperatures are projected to continue to rise. For the near future (2030), the annually averaged warming is projected to be between 0.5 and 1.2°C above the climate of 1986–2005. By 2070, the projected range of warming is 1.1 to 3.3°C, depending on future emissions.

The region's current summer average temperature is currently 28°C. This could rise to over 29°C by 2030 and to over 31°C by 2070.



Projected annual average temperature changes for the Cape York region. The horizontal line on each bar is the middle (median) projected temperature change. The extent of each bar indicates the range of projected changes.



## Hotter and more frequent hot days

There is likely to be a substantial increase in the temperature reached on the hottest days, and an increase in the frequency of hot days and the duration of warm spells.



## Uncertain changes to fire frequency

Change to fire frequency depends on the spatial variability of future rainfall. However, when and where fire does occur, its behaviour is likely to be more extreme.

Climate change projections are based on Climate Change in Australia data from CSIRO and the Bureau of Meteorology. More detailed information on these and other climate variables is available at [www.qld.gov.au/environment/climate/climate-change/resources/science](http://www.qld.gov.au/environment/climate/climate-change/resources/science).

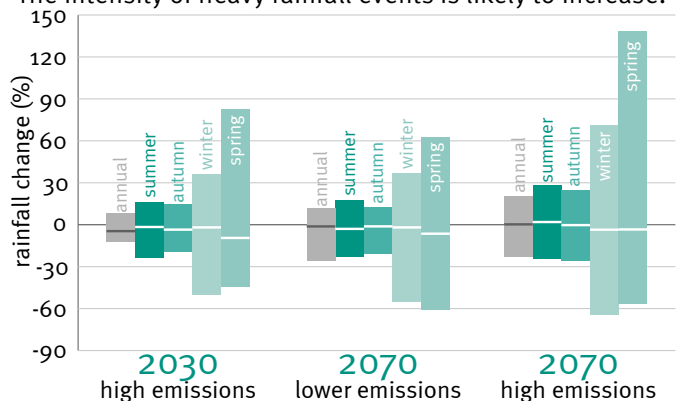


## More intense downpours

High climate variability is likely to remain the major factor influencing rainfall changes in the next few decades.

Rainfall changes for 2070 continue to show a large amount of variability.

The intensity of heavy rainfall events is likely to increase.



Projected annual and seasonal rainfall changes for the Cape York region. The horizontal line on each bar is the middle (median) projected rainfall change. The extent of the bar indicates the range of projected changes.



## Less frequent but more intense tropical cyclones

Tropical cyclones are projected to become less frequent, but with increases in the proportion of the most intense storms.



## Sea level will continue to rise

Sea level is projected to rise by 0.8m above present day levels by 2100.



## More frequent sea-level extremes

Higher sea levels will increase the risks of coastal hazards such as storm tide inundation.



## Warmer and more acidic ocean

Sea surface temperature has risen significantly across the globe over recent decades and warming is projected to continue.

The ocean will become more acidic due to dissolved carbon dioxide, with acidification proportional to emissions growth.



# Climate risks, impacts and responses

The range of likely changes to Queensland's climate in the coming years and decades presents opportunities and risks. Extensive work is being done to identify the likely impacts, sector by sector, and how best to respond to them.

Sector	Climate risks ↑ = increase, ↓ = decrease	Impacts	Potential responses
	<ul style="list-style-type: none"> <li>↑ sea level</li> <li>↑ fire weather</li> <li>↑ heatwaves</li> <li>↑ tropical cyclone intensity</li> <li>↑ inundation and flooding</li> </ul>	<ul style="list-style-type: none"> <li>Erosion and infrastructure damage along the coastline</li> <li>Increased maintenance and recovery costs</li> <li>Increased disruption to services</li> <li>Increased energy usage</li> </ul>	<ul style="list-style-type: none"> <li>Consider future climate and sea-level rise when locating and constructing new developments and infrastructure</li> <li>Increase road heights</li> <li>Insure public assets</li> <li>Design buildings to accommodate changing climate</li> </ul>
	<ul style="list-style-type: none"> <li>↑ temperature</li> <li>↑ sea level</li> <li>↑ fire weather</li> <li>↑ heatwaves</li> <li>↑ tropical cyclone intensity</li> </ul>	<ul style="list-style-type: none"> <li>Increased threats to tourism infrastructure</li> <li>Damage to popular environmental sites</li> <li>Risks to tourists unfamiliar with conditions</li> </ul>	<ul style="list-style-type: none"> <li>Consider climate risks in emergency planning for tourist sites</li> <li>Adopt appropriate cancellation policies for extreme weather</li> <li>Prepare for changing seasonal demand</li> </ul>
	<ul style="list-style-type: none"> <li>↑ sea level</li> <li>↑ fire weather</li> <li>↑ inundation and flooding</li> <li>↑ heatwaves</li> <li>↑ tropical cyclone intensity</li> </ul>	<ul style="list-style-type: none"> <li>Increased flood damage</li> <li>Increased maintenance costs</li> <li>Increased disruption to water supplies</li> </ul>	<ul style="list-style-type: none"> <li>Consider future climate and sea-level rise when locating and constructing new infrastructure</li> <li>Increase road heights</li> <li>Insure critical assets</li> <li>Implement water management planning</li> </ul>
	<ul style="list-style-type: none"> <li>↑ heatwaves</li> <li>↑ flooding</li> <li>↑ fire weather</li> <li>↑ sea level</li> </ul>	<ul style="list-style-type: none"> <li>Damage to cultural sites</li> <li>Loss of significant ecosystems</li> </ul>	<ul style="list-style-type: none"> <li>Identify cultural sites at risk and mitigate impacts</li> <li>Review and document cultural practices</li> <li>Increase cultural activities and ceremonies to transfer knowledge</li> </ul>
	<ul style="list-style-type: none"> <li>↑ temperature</li> <li>↑ heatwaves</li> <li>↑ fire weather</li> <li>↑ tropical cyclone intensity</li> <li>↑ sea temperature</li> </ul>	<ul style="list-style-type: none"> <li>Increased pest and diseases</li> <li>Crops destroyed by cyclones</li> <li>Increased thermal stress</li> </ul>	<ul style="list-style-type: none"> <li>Consider diversifying outputs or business</li> <li>Consider different crop varieties and sowing times</li> <li>Improve water efficiency</li> </ul>
	<ul style="list-style-type: none"> <li>↑ fire weather</li> <li>↑ hot days</li> <li>↑ sea level</li> <li>↑ tropical cyclone intensity</li> <li>↑ sea temperature</li> </ul>	<ul style="list-style-type: none"> <li>Cyclone and storm tide inundation damage to landscapes and natural systems</li> <li>Coral bleaching</li> <li>Existing threats to flora and fauna are exacerbated</li> </ul>	<ul style="list-style-type: none"> <li>Develop strategies to respond to new and emerging diseases and pests</li> <li>Link habitats to allow species to move</li> <li>Consider moving selected populations to new areas</li> </ul>
	<ul style="list-style-type: none"> <li>↑ heatwaves</li> <li>↑ fire weather</li> <li>↑ tropical cyclone intensity</li> </ul>	<ul style="list-style-type: none"> <li>More stress on health and emergency services</li> <li>More heat-related deaths, particularly among the elderly and disadvantaged</li> <li>Mental health effects</li> <li>Changes in disease occurrence</li> </ul>	<ul style="list-style-type: none"> <li>Use existing social networks to support vulnerable community members</li> <li>Implement rural mental health care programs</li> <li>Consider climate risks when developing emergency planning for schools, hospitals, services</li> <li>Increase green spaces and cool zones for heat stress</li> </ul>
	<ul style="list-style-type: none"> <li>↑ inundation and flooding</li> <li>↑ fire weather</li> <li>↑ heatwaves</li> <li>↑ rainfall intensity</li> <li>↑ tropical cyclone intensity</li> </ul>	<ul style="list-style-type: none"> <li>Increased sea level and storm intensity will affect coastal communities and increase inland flooding risk</li> </ul>	<ul style="list-style-type: none"> <li>Increase focus on community preparedness and prevention</li> <li>Update risk management standards to account for increased risk from climate change</li> </ul>



# Adapting to climate change

Queensland's environment, economy and communities are already experiencing the impacts from a changing climate. The development of a Queensland Climate Adaptation Strategy will assist government, businesses and communities to manage and respond to our changing climate.



## Human settlements and infrastructure

The population of the region is about 20,500, of which around 70% is of Aboriginal or Torres Strait Islander descent. About half the population lives in the settled islands of the Torres Strait.

Some communities in the Torres Strait are already being threatened by storm tide inundation and coastal erosion, and others will be threatened in the future as sea levels rise. In all areas on the coast, extreme inundation and erosion events could become more frequent, resulting in high clean-up and asset maintenance costs.

Flooding, due to more intense extreme storms, could affect water, sewerage, storm water, transport and communications infrastructure. Flash flooding and wind damage will exacerbate these impacts closer to the coast. The cost of insurance may increase as a result.

Inland, increased bushfire risk and the impact of hotter days and extreme heat events will also affect infrastructure.

## Adaptation measures

- Consider how to adapt homes and communities to deal with projected inundation.
- Plan for new infrastructure to take into account climate impacts and extreme events such as flooding, tropical cyclones and sea-level rise.
- Develop a Coastal Hazard Adaptation Plan.

The low-lying community of **Saibai** in the Torres Strait is likely to be affected by increased coastal hazard risks resulting from rising sea levels and is taking proactive measures to protect homes, schools and infrastructure, including the installation of coastal protection works in partnership with the Queensland and Commonwealth Governments.



## Tourism

The region's tourism industry includes many small operators who are responding to the strong domestic adventure-style markets of self-drive, mature-aged people who want to experience the region's natural assets, Indigenous cultural activities and historic sites. The region is considered to be one of Australia's great nature-based four-wheel drive assets and there are also existing markets for fly-in/fly-out fishing tours, bird watching and controlled feral animal hunting.

More intense cyclones will damage tourism sites and infrastructure. Severe weather may restrict the tourism season.

## Adaptation measures

- Consider climate risks in emergency planning for tourist sites.
- Adopt appropriate cancellation policies for extreme weather.
- Prepare for changing seasonal demand.



## Business and industry

The key industries in Cape York include bauxite mining near Weipa, engineering, construction, metals manufacturing, accommodation and a range of ancillary and support services.

Local communities enjoy the economic benefits from these industries through direct and indirect employment opportunities, royalties, compensation payments, investment in infrastructure, co-operative protection of the ecology and support for the development of physical and social infrastructure.

Flooding due to more intense storms could affect water, sewerage, stormwater, transport and communications infrastructure. Flash flooding, wind damage and structural damage from falling trees will exacerbate these impacts.

Businesses that are prepared will be able to ensure continuity of supply to their clients during/following a disruptive event. Investment in infrastructure, insurance and risk planning will increase as businesses prepare for the impacts.

### Adaptation measures

- Incorporate climate risks into planning and development of mining sites.
- Undertake supply chain analysis to identify critical areas that are sensitive to climate change.



## Indigenous communities and culture

The Cape York region comprises many Indigenous communities and traditional language groups, as well as a significant number of important and unique cultural heritage sites, such as the rock art around Laura. The area also boasts a rich Indigenous culture, with practices that existed prior to, and have continued since, European settlement.

Significant Indigenous cultural values are attached to the natural environments of the region and strong links have been maintained by the Indigenous community to country and wildlife, with access to land and its resources crucial for cultural value maintenance. Degradation of islands and a loss of biodiversity are threatening cultural practices.

Sea-level rise will pose a particular challenge for the coastlines and communities of Cape York. During inundation incidents, when a disruption of the water supply may occur, the short-term risk of communicable disease transmission increases. Some communities in the Torres Strait are already being regularly inundated, and sea-level rise may lead to the relocation from traditional lands.

### Adaptation measures

- Identify cultural sites at risk and mitigate impacts.
- Review and document cultural practices.
- Increase cultural activities and ceremonies to transfer knowledge.

The **Torres Strait Regional Authority** commissioned a comprehensive assessment of the risks of climate change driven coastal erosion and inundation of Torres Strait island communities. It identified and assessed specific adaptation options, and documents those options preferred by the communities. The assessment is available at [www.tsra.gov.au/the-tsra/programmes/env-mgt-program/adapting-to-climate-change](http://www.tsra.gov.au/the-tsra/programmes/env-mgt-program/adapting-to-climate-change).



## Agriculture



Cape York is an important cattle breeding region, with cattle transported outside of the region to access pastures for fattening, saleyards, processing facilities and for live export. Early season cropping on the Cape ensures crops ripen before their southern counterparts, providing a window of opportunity at the beginning of each season.

Biosecurity is a key issue for the continued viability of the horticultural industry. Conditions may become more favourable for an increase in plant diseases, weeds and pests. Cape York is at the front line to potential introductions of pests and diseases from neighbouring countries.

Increasing evaporation will result in more frequent depletion of soil moisture, reduced ground cover and lower livestock carrying capacity.

Increased animal heat stress is likely, particularly away from the coastline. This can reduce animal growth and reproductive performance, and increase mortality rates.

## Adaptation measures

- Manage climate variability and change by using forecasts of rainfall (and temperature) in decision-making about crops and planting times.
- Consider climate risks in monitoring programs for pests, weeds and disease.
- Provide more cooling mechanisms for livestock, such as shade and sprays.

The Managing Climate Variability program has developed **CliMate**, designed for producers who seek to understand recent weather and probabilities of future weather events. The tool uses weather data, statistics and forecasts with farming system information, such as soil water and heat sum. It is available at [www.australianclimate.net.au](http://www.australianclimate.net.au).

## What's happening in your region?

The Queensland Government is interested to know what innovative climate adaptation initiatives are happening in your region. You can share this information by emailing [adaptation@des.qld.gov.au](mailto:adaptation@des.qld.gov.au).



## Biodiversity and iconic ecosystems

Cape York is a remote, largely undisturbed area with outstanding biodiversity values, nationally and regionally significant landscape features and many important cultural heritage sites. These areas also provide opportunities for economic benefit through sensitive development or activities in association with areas of high biodiversity significance.

The rivers of Cape York are an intrinsic feature of the region. They have significant recreational benefits and environmental value, primarily due to their pristine nature.

The region will increasingly be subject to flooding events and inundation from sea-level rise.

Significant environmental damage has already been experienced through warming seas and ocean acidification.

## Adaptation measures

- Undertake weed management and rehabilitation of native plant species.
- Reduce vegetation clearing in critical habitats, and maintain intact ecosystems.

Green Turtles on Raine Island have recently experienced tidal inundation and beach erosion from rising sea levels affecting the viability of turtle nests and causing hazardous conditions for adult females. A partnership between the **Queensland Government, BHP Billiton, Traditional owners and the Great Barrier Reef Foundation** has been established to protect their habitat and restore the island through beach engineering, sand replenishment, and turtle monitoring. For more information see [www.des.qld.gov.au](http://www.des.qld.gov.au).



## Human health

Higher temperatures and more hot days above 35°C, combined with an increased number of extreme events, can result in heat exhaustion and increased mortality among vulnerable people, including the very young and old.

Malaria and other mosquito-borne diseases are likely to be affected by changing temperatures, humidity and rainfall.

Rural, regional and remote communities are particularly sensitive to a changing climate, compounding existing difficulties and inequities. A changing climate will also increase the demand for social support and mental health services.

## Adaptation measures

- Develop agreements with workers on how to manage extreme hot days.
- Clearly identify public cool zones or shaded areas for the community.
- Develop social support networks.

The **Queensland Government** addresses the impact of hotter days on school children by providing guidelines on managing excessive heat in schools. There are clear indicators of when children need to be protected from excessive heat, and strategies to ensure their safety, such as limiting physical activity and sporting events during the hottest part of the day. There is more information at [www.education.qld.gov.au](http://www.education.qld.gov.au).

## Queensland climate change resources

To find out more about the Queensland Government's policy response to climate change, including commitments to reduce emissions and adapt to our changing climate, visit [www.qld.gov.au/environment/climate/about-climate-change](http://www.qld.gov.au/environment/climate/about-climate-change).

The Bureau of Meteorology website provides access to weather forecasts, severe weather warnings, observations, flood information, marine and high seas forecasts and climate information at [www.bom.gov.au](http://www.bom.gov.au).

Climate outlooks are available from the LongPaddock website at [www.longpaddock.qld.gov.au](http://www.longpaddock.qld.gov.au).

Information about the projected future climate and its impacts is available from the Queensland Future Climate Dashboard at [www.qld.gov.au/FutureClimateDashboard](http://www.qld.gov.au/FutureClimateDashboard).



## Emergency services

Over the past few decades there has been a significant increase in bushfires and flooding events in the region, and some severe cyclones.

Higher temperatures and longer dry seasons could increase bushfire risk, particularly for urban fringe communities where natural ecosystems abut houses and businesses.

Increases in cyclone and storm intensity and sea-level rise will lead to a higher risk of flooding and inundation throughout the region, particularly for coastal communities.

## Adaptation measures

- Improve bushfire safety standards for urban development.
- Increased focus on community preparedness.
- Update risk management standards to account for increased risk from climate change.

**Local Emergency Alert** is a national telephone warning system used by emergency services, such as Queensland Fire and Emergency Services, to alert communities about a likely or actual emergency in your area. Local Emergency Alert sends a voice message to landlines and a text message to mobile phones, to increase community preparedness for extreme weather events and other emergencies.

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