100 years of climate change: what to expect

What can scientists tell us about how climate change will affect coastlines and cities, asks Fran Molloy.

Most Australians live in cities and towns and even houses that were built a century ago, and that are no longer suitable for the climate of 2022, which is already hotter by one degree Celsius than in 1910.

What will our cities, our coastlines and our urban landscapes look like next century, when locked-in global climate changes will push average temperatures up by at least another one to two degrees, no matter how soon we halt greenhouse emissions?

PROPERTIES

Karl Malloy, chief executive, Climate Valuation

Climate change poses huge threats to property, says Karl Malloy, who models the impact and cost of climate change on assets for large organisations. “Even properties in the middle of a city, not exposed to bushfires, not exposed to flooding and not exposed to sea level rise, will still bear risk and may be dangerous to be in during a heatwave,” he says.

Property in 2100 will have positive temperature controls (translation as well as active intervention, including safe zones for residents. “Cities and apartment blocks may have highly air-conditioned areas, where people can take temporary refuge during extreme heatwaves,” Malloy says.

By 2100, property must adapt to extremes, he says — building codes in flood-prone areas might require elevated living areas with parking underneath. “Property could comprise resilient materials that can withstand ember attacks, and self-protect with automatic sprinkler systems so people can leave safely — things we are just starting to do now will become universal,” Malloy says.

Malloy says that the scenario for people in 2100 depends on changes we make today.

“We will live in a techno-sapient world where we planned well and have prepared for climate risks in our property sector. Or we will fail to do that work and leave people to live in inappropriate properties.”

SEA LEVEL RISE AND COASTAL RETREAT

Ian Gooden/Mitchell Harley

Australia’s coastline will see serious impacts from sea level rise — varying wildly from place to place, says Dr Ian Gooden, a marine climatologist and Principal Scientist at ClimateLab advising governments and organisations on marine climate risks.

His work with paleoclimatologists and satellite data tracks sea levels during the last interglacial period, around 125,000 years ago, when global temperatures were about two degrees warmer than today, finding that while sea levels in some locations were set to eight metres higher than today — others experienced little change.

“Our notion of sea level rise is that it is universally linked to coastal erosion and coastal retreat, but in fact, it’s not a one-size-fits-all impact, and sediment supply from the continental shelf or river systems can leave sections of the coastline stable through rising seas because of that supply of sand,” he says.

Dr Mitchell Harley from the University of NSW has mapped Australian beaches using satellite photographs since the 1990s, and says most of Australia’s coastline has been

Young people have a ‘critical role’ to play

World Environment Day is inspiring young activists to speak up on climate change, writes Sandy Guy.

The dangers of climate change are mounting so rapidly they could soon overwhelm the ability of both nature and humanity to adapt unless greenhouse gas emissions are quickly reduced, the Intergovernmental Panel on Climate Change, a body of experts convened by the United Nations, reported recently.

Earth faces a triple planetary emergency — the climate is exploding too quickly for people and nature to adapt, habitat loss and other pressures mean an estimated 1 million species are threatened with extinction; and pollution continues to poison our air, land and water, reported the UN.

In many parts of the world, people are facing multiple climate-related impacts of severe floods, heatwaves, super-charged storms and bushfires. Rising heat and drought are killing crops and the putting millions at increased risk of hunger and water scarcity.

World Environment Day, led by the United Nations Environment Program (UNEP), is the largest global platform for environmental public outreach.

“The climate emergency demands action from all of us,” says Niklas Hagelberg, UNEP’s climate change coordinator.

The world is home to 1.8 billion young people aged 10 to 24, says UNEP.

Activist Imogen Senior, 20, is shaking up the climate change agenda in Australia.

and growing numbers of them are calling on global leaders to act urgently on climate change.

“Today’s youth have a critical role to play in ensuring we tackle our triple planetary crisis,” says Imogen Senior, one of many young activists shaking up the climate change agenda in Australia.

The 2019-20 Australian bushfires burnt more than 54 million hectares, destroyed more than 6,000 homes and structures, directly caused 33 deaths and almost 450 more from smoke inhalation, and killed about 1 billion animals.

On Senior’s 18th birthday, at the height of the fires, clumps of ash were landing on the roof of her home in the NSW Southern Highlands.

“The bushfires were close enough to be very scary; we couldn’t go outside because of dense smoke and ash,” says Senior, now 20, and studying politics at the University of Melbourne.

As a youth activist with Plan International Australia, a development and humanitarian organisation that advances children’s rights and equality for girls, Senior is dedicated to environmental issues.

Senior is “anxious, passionate and angry” about years of failed leadership and policy around the climate crisis in Australia. “Worldwide scientific opinion clearly hasn’t been enough to pierce the archeal attitude of some politicians and policymakers,” she says.

As an inaugural fellow in the University of Melbourne’s Wattle Fellowship — a co-curricular program for students to foster leadership on global sustainability — Senior aims to increase young people’s climate literacy and acknowledge their fear.

“We often overstate and understate climate change. It is widespread among young people; this doesn’t always translate into political literacy, political action or system change,” she says.

“Young Australians know climate change is a real and immediate threat and have much to say about it, but they are not trusted as spokespeople about an issue that affects their future.”

“They are being failed by not being equipped with the resources to take the wide gulf between them and political policy.”

A democracy needs engagement to speak to power, says Senior. “The recent federal election results, with the swing to grassroots democracy, promises real and long-term change for our country and for the planet.

“But we still have a gap between wanting to act and being able to act we aren’t yet well-equipped to evaluate parties’ policies or develop our own alongside experts.”

Last year, Senior launched Anxiety to Action, a project that aims to increase political literacy and engagement among young people anxious about climate change, which is taking a core group of 13 young Australians from all walks of life on a journey from hope to action, equipping them with the skills to develop and evaluate climate policy, and to organise and campaign.

“I want young people to be acknowledged, to be heard, and trusted as experts in their own right.”
stable over the past four decades, when sea levels rose around 10 centimetres. “Beaches are surprisingly resilient and while they can be almost instantly depleted in extreme storms, most can recover relatively quickly too,” he says.

Climate change will bring a dramatic rise in extreme events along with more rapid sea level rise, he says – meaning significant coastal inundation in some (but not all) areas. “Uncertainty is real, but our current, rigid planning instruments make it all but impossible to change, creating an inflexible way to deal with coastal erosion where billions might be spent on ineffective defences,” he says. Harvey says that over the next century, it will be important to establish buffer zones to accommodate ongoing uncertainty around how conditions respond to extreme storms and significant sea level rise.

WATER SECURITY
Professor Stuart Khan
“Water scarcity will heighten, and Australia can expect extreme weather events to increase in both frequency and severity, meaning our water systems will need the ability to be resilient,” says Professor Stuart Khan, who is Professor of Civil and Environmental Engineering at the University of NSW. “There will be increased focus on rainfall-independent water supplies, such as seawater desalination plants and underground aquifers to meet water shortages during droughts,” he says. Khan says that the key is good planning – and Victoria’s 95-year water plan includes urban water strategies that focus on the proportion of the city’s demand for water to be supplied through rainfall-independent sources, and desalination plants will play a growing role in water resilience for coastal cities.

“The other big rainfall-independent supply which will play a growing role in inland cities, is recycling through advanced water treatment processes, which we can already do, and this almost becomes an infinite source of water because you can use the same water over and over and over again,” he says. “The key to this is having secure, cheap energy sources – renewables will play a vital role here.”

URBAN GREENSPACE
Michelle Leishman
Plant ecologist Professor Michelle Leishman is Director of Macquarie University’s Smart Green Urban hub, creators of the “Which Plant Where” program guiding councils and landscapes on the plant species to best survive a harsher future climate.

“Extreme heat and declining rainfall will affect green spaces and urban vegetation – particularly for inland suburbs and towns away from coastal breezes,” she says. Leishman’s research uses government climate models and planning tools to test the plant species that can best tough out the likely future-climate extremes like heatwaves and flooding.

“We’re developing the evidence base, tools and resources for the urban forestry industry to plan over the next century,” also says Leishman. “But today’s planners also face environmental protections that are under constant siege due to rising land values, particularly in urban areas. There’s constant conflict between the larger, long-term communal good from that urban greenspace versus an individual’s capacity to make short-term profits from developing land. Finding the right balance can be a struggle.”