WASWAC

HOT NEWS

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WASWAC

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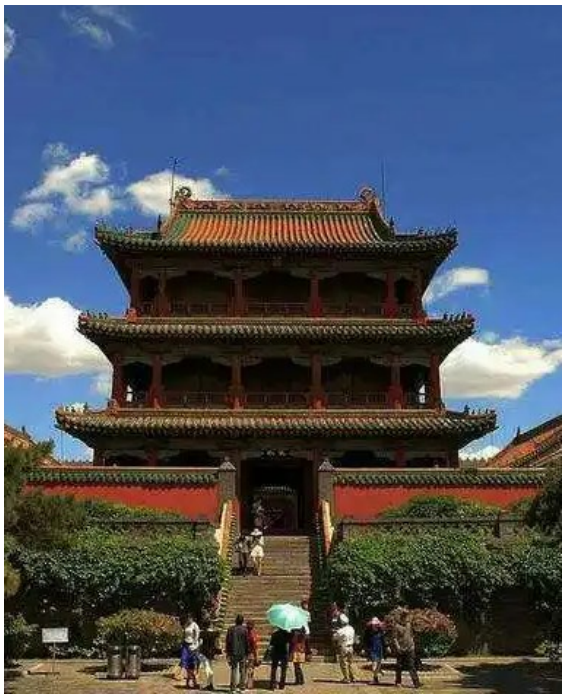
It is Time to Prepare Your Travel to Attend the 4th IYFSWC

The 4th International Youth Forum on Soil and Water Conservation will be held in 40 days. It is time to schedule your trip in details.

- ◇ Make sure you have enough time to apply for the Chinese visa
- ◇ Make sure you booked the correct flights. The most convenient arriving international airport is *DAXING INTERNATIONAL (PKX)* or *CAPITAL INTERNATIONAL (PEK)*, then take the high speed train to Shenyang.
- ◇ Make sure you reserved the hotel, if you still have not booked, please book online here: *https://4th-iyfswc-2024syau.scievent.com/hotel/booking/*
- ◇ Please make sure that you have already prepared enough clothes: the temperature in Shenyang for that time will be between 5 –25℃, and it might be raining, you are kindly asked to prepare enough clothes to keep warm.

During your preparation, please let us know any difficulties you faced through emails us by *IYFSWC_4th@syau.edu.cn* Or *waswac@foxmail.com*.



WASWAC President and Deputy President Visited Suide Soil and Water Conservation Station

Prof. Ning Duihu, President of WASWAC, and Prof. Seyed Hamidreza Sadeghi of Tarbiat Modares University, the deputy President of WASWAC, investigated the scientific research work on soil and water conservation at Jiucaigou and Xindiangou of Suide station, China. Prof. Liu Lifeng, director of the station, and Prof. Dang Weiqin made presentations and exchanged ideas. The team were interested in the theory and practice of dam system construction, integrated soil and water conservation management in small watersheds and the effect of erosion reduction.

Prof. Seyed Hamidreza Sadeghi made suggestions and recommendations on the details of the runoff observation plots and section construction, and discussed the scale conversion of field observation plots, which provides a reference method and path for future observation and research.

1st International Congress of Nature-based Ecological Restoration

Combating Sediment Surge in Tibetan Rivers

Rivers that originate in the Tibetan Plateau supply water to almost 2 billion people. They have also historically contributed about one-third of global sediment inflows to the ocean. However, in the past 35 year, more than 60% of these rives have experienced substantial increases in the amount of sediment that they carry downstream. This sediment surge threatens ecosystems, compromises landscape stability, and endangers infrastructure, especially dams. Urgent and strategic action is necessary to address sediment flow in the Tibetan region.

Over the past 5 decades, temperatures on the Tibetan Plateau have risen by 0.23℃ per decade, double the global average. Ice and snow have melted, and permafrost has been degraded. These changes, coupled with rain-induced flood peaks, have accelerated soil erosion and increased riverine sediment loads.

Increased sediment flows affect water clarity as well as aquatic life and regional ecosystems. Combating rising sediment loads on the Tibetan Plateau requires a comprehensive strategy and international cooperation.

Details:

https://www.science.org/doi/10.1126/science.ado7997

Can Our Oases Outlast the Dry Spell of Desertification?

Ever wondered how fast our planet is losing its footing? Imagine this: every time you blink, four football fields' worth of fertile soil vanish into thin air. According to the UN, that's a mind-boggling 100 million hectares gobbled up by land degradation each year! But when this happens in dry regions, it morphs into something even more sinister: desertification. Karina Lima, a climate scientist, explains below the gritty details of this silent but colossal threat to our planet's health and resilience.

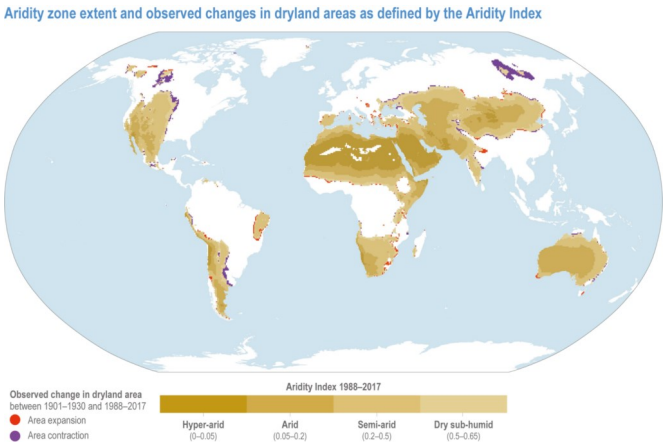
Have you heard about the Aral Sea crisis? Located in Central Asia, between the southern part of Kazakhstan and northern Uzbekistan, the Aral oasis used to be the world's fourth largest saline lake up until the third quarter of the 20th century. Today, the Aral Sea has shrunk to just 10% of its original water surface area, with the remaining land now forming the Aralkum Desert, the world's newest desert. This change has resulted in frequent sand and dust storms, causing significant environmental pollution and affecting the health of nearby communities. This is just one example of desertification, which is the degradation of land in dry regions. This phenomenon affects even oases, which are typically sanctuaries in the desert.

What constitutes desertification? Is it limited to deserts?

Thirty years ago, the United Nations Convention to Combat Desertification (UNCCD) was established and defined "desertification" as land degradation in arid, semi-arid, and dry sub-humid areas – which are known as "drylands". Therefore, even though it is intuitive to associate desertification with the expansion of deserts, in fact, the term encompasses all forms of degradation that occur in drylands, which in other definitions, may also include hyper-arid regions, thus covering almost half of the Earth's surface.

What causes desertification?

Desertification is driven by a mix of factors, including natural climate variations and human activities such as unsustainable land use and climate change caused by human actions. These elements work together and over time,



result in a degraded land, less fertile or even infertile soils, and reduced vegetation cover.

Desertification is driven by human activities such as urban sprawl, mining for minerals, the proliferation of livestock, inappropriate forms of land use and escalating levels of resource consumption. Natural landscapes are turned into areas covered with concrete which does not allow water to penetrate through and support vegetation. This makes them expand at rates that far exceed those in normal conditions, thereby causing desertification. Mining removes top soil leaving behind bare lands which are prone to erosions.

Overgrazing by livestock depletes vegetation cover, resulting in soil erosion by wind and water, while improper management practices lead to the loss of essential nutrients needed to maintain soil fertility. Another driver is deforestation, which occurs due to the insatiable demand for resources, leading to the clearance of forests that hold soils together and regulate water cycles. In addition to this, agricultural expansion involves clearing land, which is often followed by soil degradation.

But human influence goes further, as anthropogenic climate change has impacted some drylands by raising temperatures, increasing evapotranspiration, and altering rainfall patterns. Higher temperatures increase vegetation stress and soil evaporation. Changes in the hydrological cycle, leading to a gradual shift to drier climatic conditions (aridification), enhance the process of desertification. With reduced rainfall, water supply becomes deficient relative to the evapotranspirative demand of vegetation and soil. In a self-reinforcing cycle between land and atmosphere, the absence of sufficient water supply results in fewer plants. As a result, less moisture is added to the atmosphere, which intensifies aridity and further dries out the soil.

Also, with every additional increment of global warming, the frequency and intensity of extreme events increases, which can be related to hot temperature extremes over land, heavy precipitation, and droughts in drying regions – droughts that are already more likely and extreme in the current context and tend to worsen as long as global warming is not stabilized. Additionally, degraded soils have a reduced water retention capacity and are more susceptible to erosion, which can be intensified by extreme rainfall events when they occur.

Climate change can drive desertification, which in turn can also provide feedbacks on local and global climate, contributing to further global warming. This happens because the process of land degradation can produce

greenhouse gas emissions – through deforestation, overgrazing, etc. Moreover, degraded soil inhibits plant growth and has less capacity to sequester carbon from the atmosphere.

Desertification also poses a serious threat to food security and the livelihoods of about 3 billion people living in drylands. And the related impacts are not necessarily confined to these regions, as socioeconomic aspects can trigger conflicts, migrations, and several far-reaching implications.

Most drylands are located in Asia and Africa, but these sensitive ecosystems are present on all continents. It is estimated that the European Union already has about 8% of its territory affected by desertification in countries such as Greece, Spain, Bulgaria, Cyprus, Portugal, Italy, and others.

A report by the Ministry of Science, Technology, and Innovations in Brazil states there is a trend of increasing aridity across almost the entire country, mainly due to increased evaporation associated with rising temperatures caused by global warming. There has been a constant expansion of semi-arid areas for several decades, and recently, there has also been an expansion of dry sub-humid areas and the identification of arid areas for the first time. A context that suggests an acceleration of the process.

So, are our oases at threat?

Oases are critically important in arid and hyper-arid regions. They provide essential water and support life for both humans and other species. Currently found in 37 countries, they are often the only means enabling agricultural production in their regions thanks to their reliable water supply, which can originate from aquifers, rivers, and mountain snowmelt.

The global impact of climate change is increasingly affecting oases worldwide. Projections for the coming decades indicate significant changes in thermal and hydrological cycles that will particularly impact oases in countries like Tunisia, Morocco, and Saudi Arabia. But it's not just the future that is concerning, there is already evidence of desertification of oases in China, Mexico, Mesopotamian Arabian desert, and the Indian subcontinent.

A new study published in the AGU journal Earth's Future analyzed the growth of oasis areas on a global scale and concluded that most of it was due to artificial expansion projects in an unsustainable manner, while in the opposite direction, there was loss of large oasis areas due to desertification. Water is the key factor, and if the resource is overexploited to the point of exceeding its regeneration capacity or becomes less available due to climate change, the oasis may undergo desertification and be extinct. The pressure on oases is increasing in the current global warming scenario. It is heightening risks as demand for water resources rises and climate-induced scarcity and desertification amplify threats. The study also proposes strategies to enhance water resource management for achieving long-term sustainable development of oases amidst ongoing climate challenges.

Desertification, as well as land degradation and droughts, are considered major and urgent challenges of our time and are included among the 17 goals of the 2030 Agenda for Sustainable Development. Sustainable Development Goal 15 aims to "protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss"

The coming years are critical in addressing the climate change crisis and other significant environmental challenges such as desertification. These issues have arisen due to an unsustainable development model that has long viewed the Earth as an infinite provider of resources. However, by adhering to science and taking immediate action, the future can still be altered in order to make it possible for us, and for the generations to come, to survive on this planet. The choices we make today are defining our future on Earth, the common home we share with all other species that inhabit it.

Details:

https://blogs.egu.eu/geolog/2024/06/28/can-our-oases-outlast-the-dry-spell-of-desertification/

Land Degradation in Europe

Land degradation is a complex socio-environmental threat, which generally occurs as multiple concurrent pathways that remain largely unexplored in Europe. Here we present an unprecedented analysis of land multi-degradation in 40 continental countries, using twelve dataset-based processes that were modelled as land degradation convergence and combination pathways in Europe's agricultural (and arable) environments.

Spatial Coverage:

EU plus UK, CH, NO and Western Balkans (40 countries in total)

Resolution: 500m

Time Reference: 1981-2021

Format:

GEOTIFF Units: Number of land degradation processes for LMI. Binary (Non-critical / Non degraded and Critical / Degraded) for the 12 indicators

Projection:

ETRS89LAEA - ETRS89 Lambert Azimutal Equal Area

Results:

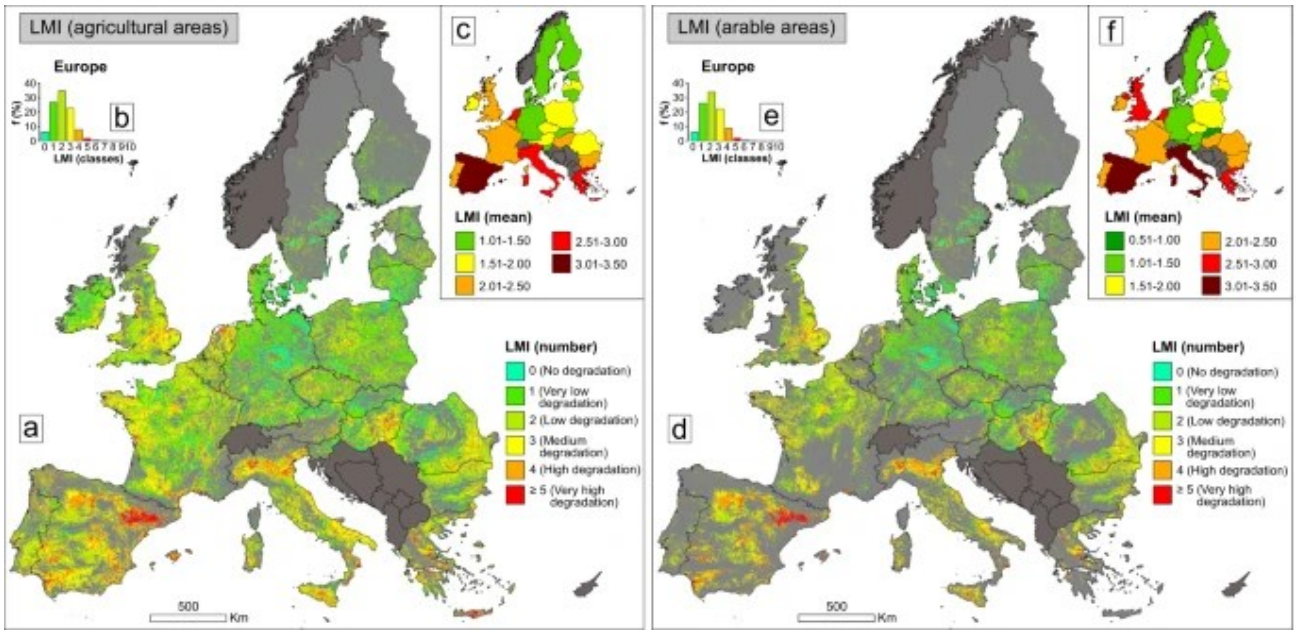


Fig. Spatial pattern of land multi-degradation in Europe

Details: *https://esdac.jrc.ec.europa.eu/content/land-degradation-europe*

Sustainable Energy Offers 'hope' in Fight Against Desertification and Land Loss

Sustainable sources of energy, including solar and wind power, can help communities across the world to reverse desertification and land loss, according to Ibrahim Thiaw, the Executive Secretary of the UN Convention to Combat Desertification.

Mr. Thiaw spoke to UN News ahead of the World Day to Combat Desertification and Drought, marked annually on 17 June .

Ibrahim Thiaw: Desertification is happening at the local level as much as it is global. Unless we address this at the local level, we will never be able to actually control it at the global level. Global policies and global decisions are needed.

The impacts are huge in terms of food security and food sovereignty.

It also drives forced migration. If people can no longer produce food on their land then they will migrate. As we have seen for example in the Sahel or Haiti, there can be severe consequences for global security. When people fight over access to land and water, it leads to more conflicts. We are seeing more of this, and it has consequences on the homogeneity of communities and on national economies.

It is estimated that up to 50 per cent of the global GDP might lost by 2050 due to challenges with agriculture and food production unless we address the issue of land loss and desertification.

UNCCD Executive Secretary Ibrahim Thiaw visits the Aral Sea in Uzbekistan, which is suffering the effects of drought.

UN News:

What is the trend right now in terms of land loss?

Ibrahim Thiaw:

Land loss is happening all over the world and land degradation is affecting both arid and less arid lands. But in terms of drylands and desertification, it is estimated that 45 per cent of the land surface is affected by desertification. Maybe it is more striking to say that 3.2 billion people or one third of the world population are affected by that. Every year a hundred million hectares of land is being degraded, an area the size of Egypt. We need to halt land degradation, but we also need to restore 1.5 billion hectares of land.

UN News:

How are you going to do that?

Ibrahim Thiaw:

By improving the techniques of agriculture, reducing the impact we are having on land in terms of extraction of minerals and other extractive industries. It is also important that we reduce the pressure in terms of people activities in some parts of the world so as to diversify the economy and create more opportunities to create income.

Restoring degraded land is not an expensive activity to undertake, but it is absolutely essential to provide more food security and to reduce conflicts. Every single dollar invested in land restoration can generate up to $30 in economic benefits, so investment in restoration activities is

quite profitable from the economic point of view. This is not just the responsibility of local communities but also of governments and crucially of the private sector because the largest driver of land use in the world is big agriculture.

UN News:

Are we talking mainly about small developing countries?

Ibrahim Thiaw:

No. It's a global phenomenon that is affecting all countries including the United States, India, China, India or Pakistan.

But the impact is much more severe in small countries, and small economies that do not have reserves, nor the insurance systems to protect their people. And the level of vulnerability is much higher in communities whose revenues are only based on the income they can generate from land.

UN News：

Desertification doesn't exist in isolation. How does it relate to climate change?

Ibrahim Thiaw:

Desertification is an amplifier of climate change. Climate change is an amplifier of desertification because of course, with extreme events, you also have severe impact on land and on communities and local economies. So basically, they are mutually interacting and it is therefore important to have a more comprehensive global picture. It is wrong to think that you

can protect biodiversity or the land without tackling the climate issue and vice versa.

UN News: The small-scale interventions at a local level are very important, but it sounds as though it's going to need a huge push from governments, from the private sector to make a real difference?

Ibrahim Thiaw: Yes, we should not discard all of the efforts that are being made by the local communities day in, day out. They need much more support from governments. They also need to see less subsidies for the agriculture industry, that is destroying the environment. Public money that, in some cases, is destroying the environment should be used to actually rebuild economies.

So, it is not necessarily that we need to inject more money, but we need to better spend the money that we have.

UN News: I guess some would say that's quite an over optimistic view that governments will be changing the way they spend their money?

Ibrahim Thiaw: Well, no, it makes sense politically. As a taxpayer, I would like to see where my money is going. If it is being invested in activities that are destroying my environment and creating eco-anxiety for my children, destroying the livelihoods of my communities, then as a voter, I would insist that my government invests my money in other areas that would be generating more income for me and creating more sustainability.

UN News: You're from Mauritania in the Sahel. Have you seen this land degradation hap-

pen in real time?

Ibrahim Thiaw: The situation is very sad. I've seen land degradation in my lifetime. But at the same time, I also have a lot of hope because I see positive changes coming. I see the younger generation being conscious of the fact that they need to reverse the trend.

I see more farmers and pastoralists trying to do their bit. I see more interventions from the international community, including from the humanitarian world that are investing in land restoration. So, I see a movement which gives me some hope that if we join our efforts and if we work in a collaborative manner, it would be possible to actually reverse the trend.

And the best hope I have is energy, which was the missing link for development and for small and medium enterprises. Energy is now accessible in remote places thanks to our ability to harness solar and wind energy.

And the possibility of combining energy and agriculture is very positive, as you can harvest water, store food, reduce the food loss. You can process that food to create chains at the local level.

Details:

https://news.un.org/en/story/2024/06/1151066

A 20-year 'mega-drought' in Australia? Research Suggests it's Happened Before and We Should Expect it Again

Droughts can have dramatic effects in Australia — decimating agriculture, threatening water resources and devastating the environment. Much of Australia is drought-prone, and the risk is expected to increase as global warming continues.

That's why it's important for Australia to be prepared for droughts, particularly those lasting multiple years.

To have some idea of just how bad things might get, we must look far back in time to see what's come before. That's where our new research comes in.

We examined computer simulations of Earth's climate over the past 1,150 years. Worryingly, we found that given enough time, natural variability in Australian rainfall can produce "mega-droughts" lasting 20 years or more.

If we add in human-caused climate change, it suggests future droughts will be far worse than we imagined.

Rainfall records aren't enough

To understand the full picture of future droughts, we need historical rainfall data. But in Australia these records only go back to around the year 1900. This doesn't fully record the huge range of natural rainfall variability over many hundreds of years.

To a degree, we can get these long records from features of the environment such

as trees, which record information about rainfall changes in their annual growth rings. Unfortunately, these natural "archives" generally only reach back a few hundred years. And they only store information about what's happened in their local area, not across all of Australia.

Scientists need alternative ways of looking back in time — and that's what our new research set out to do.

We used computer models of Earth's climate from the years 850 to 2000 (1,150 years in total) to fill in the picture. The models simulate the interactions of the atmosphere, oceans, ice and land, and so provide a picture of how the climate has changed through time.

Because no single climate model is perfect, we used an "ensemble" of 11 different climate models to explore the range of droughts Australia has experienced.

First, we looked at the characteristics of Australian droughts due to natural fluctuations in rainfall. Then we compared the simulated droughts during the 20th century with those from the pre-industrial period (before the year 1850). This let us test if human-caused climate change during the past century has caused detectable changes in Australian droughts.

We paid particular attention to the Murray-Darling Basin in southeastern Australia. It contains Australia's largest river system and is our largest agricultural region, so it's important to know how bad droughts there could be.

Our results:

We found during the 20th century, simulated droughts in southwestern and eastern Australia — including the Murray-Darling Basin — were longer on average compared with pre-industrial times.

This change is consistent with the rainfall trends expected in these regions in future due to human-caused climate change. It suggests that an emerging human influence on our climate has already made southern parts of Australia more drought-prone.Other characteristics of simulated Australian droughts, such as their intensity or recurrence, didn't show marked differences last century compared with pre-industrial times. In other words, human-caused climate change had probably not yet caused Australian droughts to be any drier, or changed how often we are in drought. But this influence could still emerge as climate change worsens.

The devastating impacts of Australia's last major drought from 2017 to 2019, known as the "Tinderbox" drought, are a stark reminder of what we might expect in future. The drought was likely worsened by human-

caused climate change, and preceded the catastrophic Black Summer fires.

How bad could Australian droughts be?

One of the most concerning findings from our research is that even without the effects of climate change, natural variability can produce "mega-droughts" in Australia lasting 20 years or more. That is far longer than any drought that has been experienced in Australia since instrumental records began.

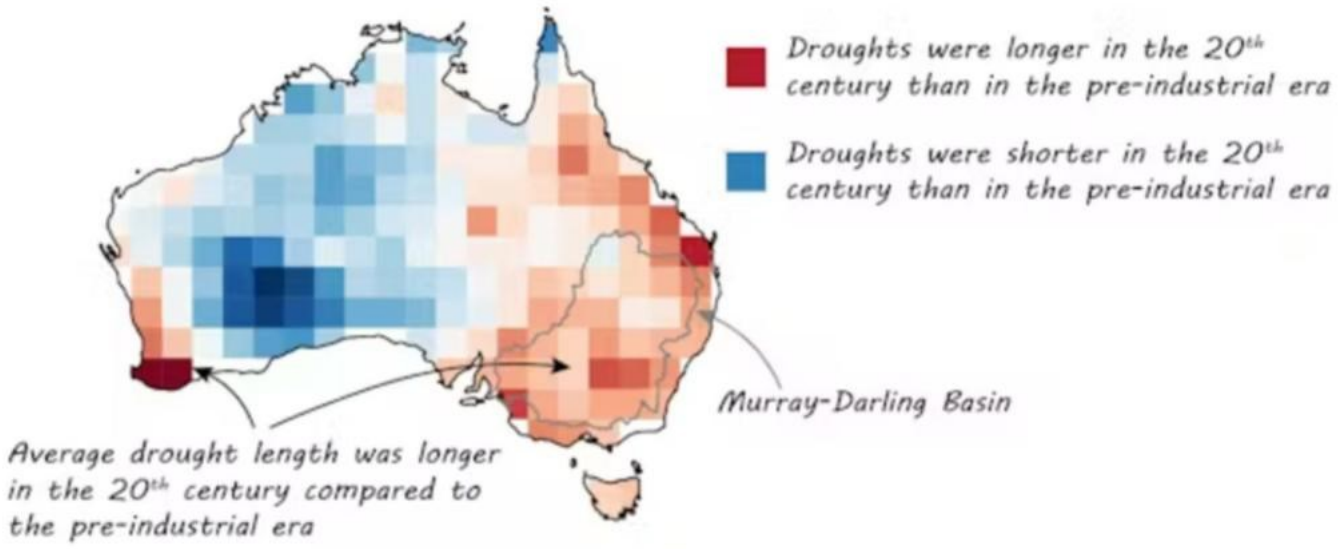
Our findings show mega-droughts are possible across the Australian continent. This includes the Murray-Darling Basin where typical droughts last century lasted four to five years. The graphic below shows the worst of these since direct rainfall records began. A 20-year drought would make these extremes seem short-lived.

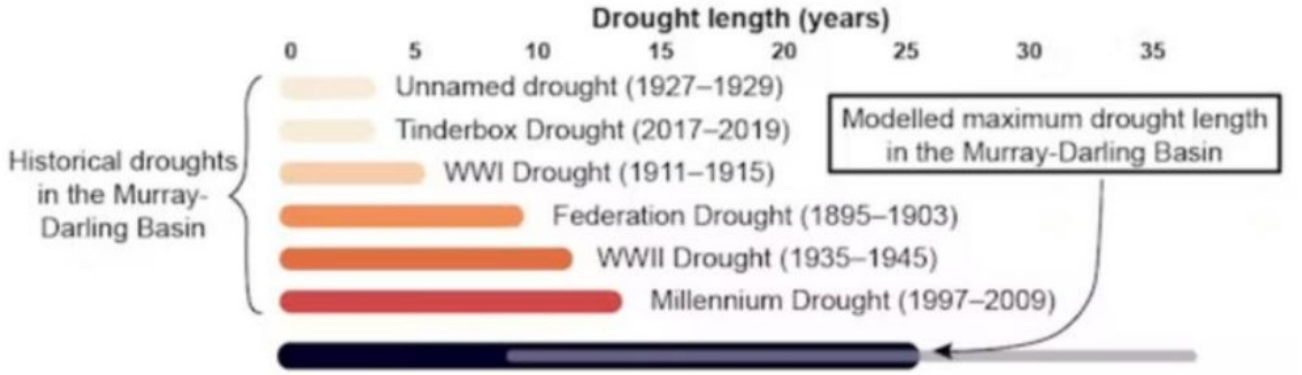
Mega-droughts are possible in Australia.

This new research shows mega-droughts in Australia are possible — even without the influence of climate change. They are a natural part of Australian rainfall variability over the long term. This finding is supported by evidence drawn from ice cores, which suggests a 39-year drought gripped eastern Australia about 800 years ago.

This is concerning, because climate change is also increasing the chance of reduced rainfall across much of southern Australia.

It's difficult to imagine a drought lasting several decades. But our research suggests it can





happen, and future droughts in Australia will be worse than any in our recent historical experience.

Our work highlights the need to consider the unthinkable when it comes to preparing for future droughts. This has implications for industry, governments and communities as they adapt to a warmer future.

Details:

https://7news.com.au/weather/severe-weather/a-20-year-mega-drought-in-australia-research-suggests-its-happened-before-and-we-should-expect-it-again-c-14203212

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