Counting the cost
2021
A year of climate breakdown

December 2021
Christian Aid is a Christian organisation that insists the world can and must be swiftly changed to one where everyone can live a full life, free from poverty.

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Executive summary

2021 saw the ravages of Covid-19 spread around the globe causing suffering and disruption, particularly in parts of the world without vaccine supply and healthcare infrastructure. Although Covid dominated the headlines, the climate crisis continued to rage, creating its own path of devastation.

This report highlights the ten most financially devastating climate events of 2021, from hurricanes in the US, China and India to floods in Australia, Europe and Canada. We also look at five events which while carrying a lower financial cost brought devastating human impacts such as drought in Africa and Latin America and floods in South Sudan.

The top ten most expensive events financially all cost over 1.5 billion dollars of damage with Hurricane Ida in the US topping the list at $65 billion. The floods in Europe came second at $43 billion.

Unless the world acts rapidly to cut emissions these kinds of disasters are likely to worsen. Steve Bowen, Meteorologist & Head of Catastrophe Insight at insurers Aon has noted that 2021 is expected to be the sixth time global natural catastrophes have crossed the $100 billion insured loss threshold. All six have happened since 2011 and 2021 will be the fourth in five years\(^1\).

Worryingly, despite the pandemic concentrations of greenhouse gasses in the atmosphere reached a new all-time record according to a study by the World Meteorological Organisation published in October.\(^2\) And the latest Emissions Gap Report published by the UN’s Environment Programme last month showed that the national climate plans which make up the Paris Agreement were not currently on track to ensure global heating is kept below 1.5°C.\(^3\)

The COP26 summit in Glasgow generated plenty of headlines but without concrete emissions cuts and financial support the world will continue to suffer. One glaring omission from the outcome in Glasgow was a fund to deal with the permanent loss and damage caused by climate change. This is one issue which will need to be addressed at COP27 in Egypt in 2022.
Most expensive, chronologically:

1. Texas Winter Storm (US, $23 billion)
2. Australian floods (Australia, $2.1 billion)
3. French cold wave (France, $5.6 billion)
4. Cyclone Tauktae (India, Sri Lanka, Maldives, $1.5 billion)
5. Cyclone Yaas (India, Bangladesh $3 billion)
6. European floods (Europe, $43 billion)
7. Henan floods (China, $17.6 billion)
8. Typhoon Infa (China, Philippines, Japan, $2 billion)
9. Hurricane Ida (US, $65 billion)
10. British Columbia floods (Canada, $7.5 billion)

Other extreme weather events:

11. Paraná river drought (Argentina, Paraguay, Brazil)
12. South Sudan floods (South Sudan)
13. Lake Chad crisis (Nigeria, Niger, Chad, Cameroon)
14. Pacific Northwest heatwave (US, Canada)
15. East Africa drought (Kenya, Ethiopia, Somalia)
### Counting the cost 2021: A year of climate breakdown

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
<th>Type</th>
<th>Location</th>
<th>Deaths</th>
<th>Number of people displaced</th>
<th>Economic cost (USD)</th>
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<td>Texas Winter Storm</td>
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<td>US</td>
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<td>Tropical cyclone</td>
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<td>Floods</td>
<td>China</td>
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<td>Floods</td>
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<td>Hurricane Ida</td>
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<td>Canada</td>
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**Other extreme weather events**

<table>
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<th>Date</th>
<th>Event</th>
<th>Type</th>
<th>Location</th>
<th>Deaths</th>
<th>Number of people displaced</th>
<th>Economic cost (USD)</th>
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<td>2019-2021</td>
<td>Paraná river drought</td>
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<td>1970-2021</td>
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<td>Pacific Northwest Heatwave</td>
<td>Heatwave</td>
<td>US, Canada</td>
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<td>2020-2021</td>
<td>East Africa drought</td>
<td>Drought</td>
<td>Kenya, Ethiopia, Somalia</td>
<td>N/A</td>
<td>N/A</td>
<td></td>
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</table>
1. US: Texas Winter Storm

In February, a winter storm formed in the Pacific and moved into the United States. More than 150 million people were placed under winter storm warnings. During the storm, Texas suffered a massive power outage that led to shortages of basic supplies, leaving around five million people without electricity. While officially there were 215 deaths recorded in Texas, it has been estimated that the true number could be three times higher.

While insured losses have been calculated at $23 billion, the total economic impact could be as high as $200 billion, according to some estimates.

While the last 10 years have been the hottest on record (and 2021 will very likely continue this trend), cold spells such as this one are still within what is expected from natural climate variability - and some studies have linked human-caused global warming (and particularly the warming of the Arctic) with colder winters in mid-latitude regions such as North America, Europe and parts of Asia.

Scientists do not fully understand how these cold spells occur within the overall pattern of global warming, but there are two possible explanations, both related to the warming of the Arctic. One of them involves the jet stream, a fast river of air that flows high above the Earth’s surface encircling the mid-latitudes and high altitudes. As the
Arctic warms, the push and pull on the jet stream is lessened, resulting in a weaker air stream that is more likely to get stuck in one place, leading to more persistent weather conditions in specific places, which can cause extreme events, such as heatwaves, drought and cold spells.

The other mechanism relates to the polar vortex, a low pressure area of swirling cold air that remains in polar regions. Typically, the polar vortex keeps cold air bottled up. But if the vortex is disturbed (e.g., due to the warming of the Arctic), this mass of cold air could be displaced southward, causing temperatures to drop in North America and Eurasia.

2. Australia: Floods

In March, many parts of the Eastern Australian coast experienced massive rains and extensive flooding, causing two deaths. In coastal New South Wales, where the city of Sydney is located, the week of the floods became the wettest ever recorded. Around 18,000 people had to be evacuated from the region, with damages totalling $2.1 billion.

According to a peer-reviewed study published in November, atmospheric conditions like the ones that led to these floods will become up to 80% more likely by the end of the century if carbon
emissions are not reduced to keep global temperature within the goals of the Paris agreement.

Australia’s climate targets are “highly insufficient” to meet the Paris Agreement, according to Climate Action Tracker. Its energy sector still relies heavily on fossil fuels, with 54% of the country’s electricity coming from coal-fired power stations. It is also the world’s biggest exporter of coal and gas. Coal is the fuel that contributes the most to global warming and gas, while cleaner, is no friend to the climate.

3. France: Warm winter and cold Spring wave

In early April, a cold wave affecting large parts of central France caused great agricultural losses, in particular to vineyards. The Minister of Agriculture, Julien Denormandie, described the event as “probably the biggest agricultural disaster in the beginning of the 21st century”. On April 8 the government announced it would declare a state of agricultural disaster, a measure aimed at compensating affected farmers for their losses.

In the Rhône region, farmers estimated that the cold spell may have destroyed more than 80% of their harvests, affecting wines such as Côte-Rôtie, Côtes du Rhône and Condrieu. In Burgundy, “at least 50%” of the harvests were reportedly lost, with the prestigious
Chablis variety especially hard hit. The cost of the impacts of the cold wave have been estimated at $5.6 billion.

A study conducted by the World Weather Attribution found that climate change increased the likelihood of this type of damaging cold waves by about 60%. The analysis showed that while global warming actually made the cold wave less likely, the high temperatures in the previous months made bud burst happen earlier in the year. During the bud burst stage, vineyards are especially susceptible to frosts.

Despite being home to around 0.84% of the global population, France is responsible for about 2.28% of all greenhouse gas emissions produced historically. The country has pledged to reduce its emissions by 40% by 2030, compared to 1990 levels. However, climate activists say the government is not doing enough to reach this target and argue the new climate law passed by the government this year falls short on ambition.

4. India & Sri Lanka: Cyclone Tauktae

In May, tropical cyclone Tauktae formed in the Arabian Sea and moved towards the west coast of India, affecting also the Maldives and Sri Lanka. It was the strongest cyclone to make landfall in the

Trees in Mumbai uprooted by Cyclone Tauktae. Photo: VatsalSheth/Shutterstock
state of Gujarat since 1999.\textsuperscript{26} Intense winds, rainfall and flooding, left widespread damage totalling more than $1.5 billion.\textsuperscript{28} At least 198 people died, including 71 from a barge owned by India’s Oil and Natural Gas Corporation that sank off the coast of Mumbai. In the state of Gujarat, more than 200,000 people had to be evacuated from their homes.\textsuperscript{29}

Cyclone Tauktae underwent a process called rapid intensification, by which tropical cyclones gain wind speed and strength in relatively short periods of time, which makes it harder to prepare for landfall, and which is becoming more frequent due to climate change.\textsuperscript{30}

India is currently the third largest emitter of greenhouse gases in the world.\textsuperscript{31} The country’s current targets to reduce carbon emissions are considered “highly insufficient” and “not consistent with the Paris Agreement’s 1.5°C temperature limit” by Climate Action Tracker.\textsuperscript{32} However, India’s historical contribution to carbon emissions is relatively small, especially considering the size of the country and its large population.\textsuperscript{33}

5. India & Bangladesh: Cyclone Yaas

In May, tropical cyclone Yaas formed in the Bay of Bengal and moved towards Bangladesh and India, forcing thousands of people to leave their homes and killing 19. In addition to the heavy rainfall, the cyclone caused a strong storm surge which destroyed

Flooded street in Kolkata, India, following Cyclone Yaas. Photo: Saikat Paul/Shutterstock
embankments and inundated low-lying areas in West Bengal. Wind speeds reached 140 km/h. Economic losses were estimated at $3 billion40 and more than 1.2 million people living in low-lying areas had to leave their homes. In Odisha, more than 10,000 villages were damaged.

The intensity of cyclones hitting the countries around the North Indian Ocean has been increasing over the last decades.41 As the planet becomes warmer due to human-caused greenhouse gas emissions, the atmosphere can hold more water, driving extreme rainfall during cyclones, which can lead to more flooding42. In addition, global sea levels have already increased about 21-24cm since pre-industrial times as a result of human greenhouse gas emissions.43 As the sea level rises so does the distance that storm surges can reach.44

Due to its geographical situation and socio-economic conditions, the countries in the Bay of Bengal, such as Bangladesh, are some of the world’s most vulnerable regions to climate change. In addition to being densely populated, the conditions in the bay are ideal for tropical cyclone formation. Also, the lowlands in the Ganges delta are prone to flooding and saltwater intrusion.

6. Western & Central Europe: Floods

Extreme rainfall hit parts of Western Europe from 12-15 July, with some regions around the Ahr and Erft rivers in Germany
experiencing more than 90mm of rainfall over a single day. The resulting floods killed at least 240 people and caused widespread damage, with economic losses estimated at more than $43 billion.

A study by World Weather Attribution concluded that climate change made extreme rainfall events similar to those that led to the floods in Germany, Belgium, the Netherlands and Luxembourg between 1.2 and 9 times more likely to happen, and that such downpours in the region are now 3-19% heavier because of human-caused warming.

While the region has decreased its carbon emissions by 31% since 1990, Europe is still responsible for around 18% of all human-caused greenhouse gases in the atmosphere. Current plans to reduce carbon emissions include reducing them 'at least' 55% by 2030, compared to 1990 levels, and to become net zero by 2050. However, the region’s climate targets are still “insufficient” to meet the Paris Agreement, according to Climate Action Tracker.

7. China: Henan floods

In July, torrential rains in the Chinese province of Henan caused massive floods and the death of 302 people. More than 1 million people had to be relocated and hundreds of thousands lost their houses.

In Zhengzhou, capital city of the province, 617.1 mm of rain fell in three days, an amount similar to the annual average for the region.
The rain flooded the underground rail system, leaving many passengers trapped. In Xinxiang, the banks of the river Wei burst after the city recorded 260 mm of rain in just two hours. According to an estimate, the damage caused by the floods amounts to $17.6 billion.

As the planet warms, a greater proportion of China’s rain will fall as more concentrated downpours. Also, a 2016 study found that China is the country with the highest risk of floods in the world - a situation that will worsen if carbon emissions continue to rise unchecked.

China is the world’s most populous country and currently the world’s largest emitter. It’s climate targets are classified as “highly insufficient” to meet the Paris Agreement by Climate Action Tracker. However, in cumulative terms and considering the country’s large size and population, China’s historical contribution to climate change is smaller than that of many rich countries.

Last year, President Xi Jinping announced that the country’s emissions will peak by 2030 and it will become carbon neutral by 2060.

8. Typhoon In-fa

In July, a tropical cyclone named Typhoon In-fa (known as Typhoon Fabian in the Philippines) impacted several countries in Asia, including Japan, the Philippines and China. The cyclone reached Category 2, with wind speeds of up to 176 km/h and large amounts of heavy monsoon rain linked to Typhoon In-fa causes severe flooding on residential property near Calapan City, the Philippines.
of rainfall. The city of Zhoustan, in China's Zhejiang province, registered 612mm of rain in a single day.

The typhoon forced thousands of people from their homes. In Shanghai, airports had to be closed and train services were shut down. And more than 20,000 had to be evacuated in Manila. The economic cost of the typhoon has been estimated at $2 billion, and there were six casualties reported.54

Climate change is increasing the frequency of Intense rainfall events, as a warmer atmosphere can hold more water vapour55. And as the planet warms and sea surface temperatures increase, experts expect that typhoons, in the Philippines and elsewhere, will become stronger.5657

The Philippines’ plan to reduce greenhouse gas emissions is compatible with a 2°C world warming, compared to pre-industrial levels, according to Climate Action Tracker. While the country bears little responsibility for global warming, it is highly at risk from tropical cyclones, a situation that will worsen over the next few years due to climate change.58 On the other hand, China and Japan are two of the world’s largest greenhouse gas emitters in Asia. Japan’s plans are classified as “insufficient”, and China’s as “highly insufficient” by Climate Action Tracker.

9. US: Hurricane Ida

![Devastation caused by Hurricane Ida along the Gulf Coast. Photo: US Coast Guard](image-url)
In late August and early September, a Category 4 hurricane called Ida hit several parts of the United States. It was the fifth strongest hurricane to make landfall in the country. In the state of Louisiana, one million people were left without electricity. In one of the city’s parishes, 75% of the houses were destroyed and 14,000 people forced to move. Ida also caused flash floods in many Northeast states, including Delaware, Pennsylvania, New Jersey, and New York. In total, Ida caused 95 casualties and damages amounting to $65 billion. Three months after the hurricane hit, many displaced people were still looking for a suitable place to live.

In the Atlantic ocean, there has been an increase in the number of named storms since 1980. Also, climate change is causing tropical storms to have stronger winds and cause more intense downpours.

The US is the largest cumulative greenhouse gas emitter and thus the country that has contributed the most to global warming. After temporarily withdrawing from the Paris Agreement, the country has recently re-joined the deal under the current presidency of Joe Biden. Despite having pledged to reach net-zero emissions by 2050, the country’s current emission targets are considered “Insufficient” by Climate Action Tracker.

10. Canada: British Columbia floods

In November, parts of British Columbia, in Canada, experienced record levels of rainfall. The rains were linked with a climatological phenomenon called “atmospheric rivers”, narrow plumes of water that can travel through the atmosphere carrying large amounts of water. They are often associated with extreme precipitation events.
The intense rains forced thousands of people to leave their homes and cut off Vancouver from the rest of the country. The provincial government of British Columbia declared a state of emergency on November 17, three days after the massive rains started. In Merritt, a city northeast of Vancouver, the volume of rain was three times the historical high.® The city had to be completely evacuated due to massive flooding with all 7,000 residents forced to flee.

At least four people died and the infrastructure damage has been estimated at $7.5 billion.®

Intense rainfalls are one of the best-established consequences of climate change. As global temperatures increase, the atmosphere can hold more water vapour, leading to stronger downpours.® Canada’s Prime Minister, Justin Trudeau, connected the floods with the warming of the planet, saying that the impacts of climate change have arrived “sooner than expected, and they are devastating.”®

According to a recent analysis by Carbon Brief, Canada has contributed around 2.6% of all carbon emissions, making the country one of the ten top cumulative emitters.® Considering its relatively small population, Canada is among the worst carbon polluters on a per capita basis. The country’s current emission reduction targets are considered “highly insufficient” by Climate Action Tracker®.

While the above disasters all brought financial costs worth over $1.5 billion, other disasters of 2021 caused widespread damage to people or ecosystems without such high financial costs.
11. Paraná river drought

The Paraná river is currently at its lowest levels in the last 77 years. The river, which spans over 4,880 km across Brazil, Argentina and Paraguay, plays a critical role in the region as a source of hydroelectric power and a very important trading route.

The low levels are associated with reduced rainfall. Precipitation in the four states surrounding the top of the Parana have plunged from a daily average of 160 millimetres in the 1990s to just half that amount now.71 Rains in four states around the Parana river decreased from a high of 160 millimetres in 1990 to just half that amount now, with the largest decrease taking place in the last ten years.71 A study published this year predicts that climate change will intensify droughts in South America if greenhouse gas emissions are not reduced.71

The drought is having a large impact on the region. Argentina relies on the river to export 80% of its agricultural products, an important source of income for the country.72 And electricity production in the dams of Yacyretá and Itaipú has also been affected by the low levels of water. Other impacts include reduced fish catch and more frequent wildfires.

Experts have suggested that both climate change and deforestation - itself a cause of climate change - might have contributed to the ongoing drought.73
12. South Sudan: Floods

Over the last few months, intense flooding has affected more than 850,000 people in South Sudan, affecting 33 out of 78 counties. The floods are taking place around in areas along the Nile and Lol rivers and in the Sudd marshlands. The United Nations has described the situation as "the worst flooding in decades". Many of the impacts faced today by the country are the result of cumulative damages, as this is the third consecutive year with intense flooding.

The United Nations has recently blamed climate change for the situation in South Sudan. A report released this year by the World Meteorological Organization notes that climate change is contributing to food insecurity, poverty and displacement in Africa through "changing precipitation patterns, rising temperatures and more extreme weather".

South Sudan is part of the region of Africa already experiencing strong effects from climate change, including a large increase in the likelihood and intensity of heavy rainfall. More intense downpours are expected as the planet warms.

Case Study: Asunta Nyanut Deng, 55, from Northern Bahr el Ghazal

Floods in the lowlands of Jonglei & Upper Nile and drought in the Bar El Gazal areas, compounded by conflict, the COVID-19 pandemic, and locust storms, have meant people are going hungry.
Asunta Nyanut Deng, a farmer from the area where Christian Aid have been working, said: “Before the flooding, my life was good. Now, I do nothing except look for a way to survive, with no hope – which is hard. I also go to look for the greens and fruits in the bush. If I get some, then I bring to my children, because I don’t have cow or goat.

“There is not food in this village. Whenever we cultivate, the rainfall floods my small farm and destroys it. It destroyed my farm and the home. For people who have herds they also suffer with their herd too, because there is no green pasture for them. I don’t have a hope in the farm.

“We have nothing to eat. We will not have anything to eat in the near future. My family and I are worry because we are living in hardship caused by flooding. Life is hard on my family. Life is not favourable here.”

13. Lake Chad Crisis

Lake Chad extends across several African countries in the Sahel, a vast semi-arid region just south of the Sahara desert. More than 17
million people live in the area, which has been facing violent extremism and terrorism for years, alongside food insecurity, human displacement and severe poverty. Due to the situation, more than 2 million people have been forced to leave their lands and move to new locations.²³

Since the 1970s, the lake has shrunk about 90% of its original size after repetitive droughts. In 1963 the lake covered 26,000 square kilometres. Now, it is less than 1,500 square kilometres.⁴⁴

A recent analysis showed that temperatures have increased and precipitation has decreased in different regions of Lake Chad between 1951 and 2015. These trends are expected to continue in the future.⁸⁵

Also, since the 1970s, rainfall in the Sahel region has experienced strong interannual variability due to climate change, increasing vulnerability in the region, as many people rely on agricultural activities.⁸⁶

### 14. Pacific Northwest: Heatwave

At the end of June and in the early days of July, an unprecedented heatwave brought hugely record-breaking temperatures to some parts of West North America. It set a Canadian temperature record of 49.6ºC, well above the previous national record of 45ºC. Lytton, the village where the record was set, was completely destroyed a few days later in a wildfire.

An analysis released in November estimated that 595 people had died in British Columbia, Canada, as a consequence of the heatwave, 231 of them in a single day, June 29.⁸⁸ Another estimate set the total death toll at 1,037 people, 229 in the US and 808 in Canada.⁸⁹ According to one estimate, more than a billion marine...
animals might have died due to the high temperatures. There are no estimates of the total economic costs of the heatwave.\textsuperscript{56}

An attribution study conducted by researchers of the World Weather Attribution group concluded that the heatwave would have been “virtually impossible” in the absence of human-caused climate change\textsuperscript{51}. A study published this year shows that the faster the planet warms, the higher the probability that climate extremes records are broken by a larger margin.\textsuperscript{52}

**15. East Africa: Drought**

Almost 60 million people are experiencing food insecurity in East Africa, according to the United Nations World Food Programme. The region of the Horn of Africa, encompassing Somalia, Ethiopia, and Kenya, has suffered from several droughts over the last decade, many of them back-to-back. The drought is also taking a toll on the region’s wildlife and livestock.\textsuperscript{63}

Low rains and drought conditions have been prevalent in the region over the last two years, affecting crop production and water availability\textsuperscript{64}. In Kenya, poor rainy seasons over the last years have pushed more than 2 million people in the arid and semi-arid counties struggling to find food.\textsuperscript{65} In Somalia, more than 80% of the country is suffering “severe drought conditions” and 100,000 people have been forced to leave their houses.\textsuperscript{66} And in Ethiopia, an armed conflict in the region of Tigray has fueled the impacts of the drought.
The drought situation is projected to extend to 2022, with higher impacts if carbon emissions are not reduced. According to predictions, as the planet warms, many regions of East Africa will suffer more frequent dry spells.

Case Study: Sadia Isako, activist supporting women groups in Marsabit County, Northern Kenya.

Women are particularly vulnerable to the problems caused my the climate crisis. Sadia Isako, said: “Women face so many challenges, but mainly issues related to climate change. Marsabit County is not what it used to be in the past, but because of the climate, so many things have changed. Most services are not easily available, you have to go far in search of everything.

“Water is a problem, and considering these are pastoralists who need pasture, and they have to travel far for that. Women are also needed at home for various chores, and they need to take care of the children, and husband. And because of the dry conditions, the woman is left at home with the children as the men go in search of pasture.

“Climate change has become a major challenge to women because we expected the rains in April, it did not come. Our crops have dried, and we don’t have water. We are forced to buy water, with one jerry can going for Sh30, or if you want to buy the 5,000 litres, it'll cost you Ksh5, 000. For those who don't have the cash, it’s a problem.”

Recommendations

- To prevent further disasters, countries must urgently cut greenhouse gas emissions. While some countries have put forward ambitious plans, others need to step with greater action. Urgent implementation must be a top political priority.

- Richer countries need to provide more funding to support vulnerable communities living in poorer countries to help them adapt and build resilience to the impacts of climate change. These countries have done the least to cause the climate crisis but suffer its effects disproportionately.

- Specifically a fund to address the loss and damage caused by climate change needs to be set up by the end of COP27.

- All Governments must invest in the energy transition to renewables. Richer countries should support developing countries so they can leapfrog the fossil fuelled development path taken by richer nations.
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7/we-will-all-die-in-kenya-prolonged-drought-takes-heavy-toll

https://www.aljazeera.com/news/2021/11/1
9/un-sounds-alarm-on-somalias-rapidly-worsening-drought

96 https://publications.jrc.ec.europa.eu/repository/handle/JRC111076

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