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The impact of climate change on tourism in Australia – a case study relating to bushfires in Australia in 2019/2020

Abstract. The main purpose of the study is to offer a preliminary analysis of the impact of Australian bush fires on tourism in the summer season of 2019/2020. The article addresses issues related to global climate change, including Australia. The author discusses the causes and effects of recent catastrophic fires in Australia, focusing on their negative impacts for tourism. Another problem raised in the article is how climate change in Australia causes bushfires that destroy the nature and life of this country. The study mainly analyses the effects of climate change on the natural environment, especially on the most attractive tourist areas in Australia, i.e. national parks. The study uses the latest information to show the effects of damage caused by fires in Australia, especially in tourism. The author concludes that there is a direct relationship between climate change resulting from global warming and tourism demand.

Keywords: global warming, bushfires in Australia, tourism

JEL Codes: Q, Z

1. Introduction

Climate change can have catastrophic consequences. Global climate changes, observed and discussed in the international arena, have an impact on natural ecosystems and on various sectors of the economy (agriculture, industry, transport, insurance, etc.), including tourism. Recently, people all over the world have seen the effects of climate change in the form of bushfires in Australia, which have devastated vast areas of natural beauty, areas that have for many decades been

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ranked very high in terms of the quality of life of residents, ecological conditions, air purity and the number of tourists. Recent fires, which raged Queensland, New South Wales, South Australia and Victoria for several months, have changed this idyllic picture radically, as expressed in the following tweet: “Come visit Australia: get an early preview of Armageddon” [*Tourism Australia pauses \$ 15 million ... 2020*].

The following article addresses the causes of climate change in Australia, which result in bushfires destroying nature and devastating the country’s life, using the latest information to show the effects of damage caused by the recent bushfires, especially in the tourism sector. The article is mainly based on the analysis of news reports and information published online (especially Climate Council, Tourism Research Australia, The Sydney Morning Herald, The Guardian Australian Edition and ABC News).

2. Climate change in the world including Australia

Climate change caused by global warming is a fact. Changes in air temperature over the last 50 years (according to weather station data) show a clear, strong rising trend [Kruczek, Kruczek, Szromek 2018]. Believers in anthropogenic climate change accept that global warming is caused by human activities, which is contested by sceptics, who regard it as a natural process, where the human contribution is minimal [Van Oldenborgh et al. 2020]. Global warming causes an increase in the average atmospheric temperature at the surface of the earth and oceans, and “the path of future climate change will depend on what courses of action are taken by society – in particular the emission of greenhouse gases from the burning of fossil fuels” [Mann 2018]. Climate research, monitoring and analysis have been carried out since 1988 by the International Expert Group on Climate Change the Intergovernmental Panel on Climate Change (IPCC) operating under the auspices of the United Nations. According to its own website, “The IPCC was created to provide policy makers with regular scientific assessments of climate change, its implications and potential future threats, and to put forward for adaptation and mitigation options. Through its assessments, the IPCC determines the state of knowledge on climate change.”¹ From the analysis of the work of the IPCC it can be concluded that human activity is a major factor contributing to climate change, causing global warming, which leads to the destruction of

¹ www.ipcc.ch [accessed: 6.06.2020].

the natural environment and life on Earth [AR5 Synthesis Report... 2014]. The greenhouse effect is intensifying because there is more and more carbon dioxide and other greenhouse gases in the atmosphere. In 2015 in Paris, 195 countries signed a climate agreement that is expected to stop global warming at a level far below 2 degrees Celsius, possibly at 1.5 degrees until the end of the century [The Paris Agreement 2015]. Australia, which also signed the agreement, has the largest share of greenhouse gas emissions in the world. Australia has pledged to reduce its emissions to 26-28 per cent on 2005 levels by 2030 [Australia's 2030 climate change target 2015].

In many reports and articles in 2018, it was observed that the multi-annual tourism industry in Australia was increasingly threatened by climate change [Australia tourism industry... 2018].

In recent years, climate change has been associated with an increase in the temperature of the Indian and Southern Oceans, which in turn was responsible for dry and warmer weather in Australia in the summer of 2019-2020. It should also be noted that fires alone can contribute to climate change.

According to Nerilie Abram, "there is a 'scientifically indisputable' relationship between current extremes and anthropogenic climate change, there are other reasons why the fire season was so dramatic [Abram 2019]. For example, one factor in Australia's long-term decline in winter rainfall is the positive trend in the Southern Annular Mode (SAM) [Abram 2019]. According to Johnston, another factor is the positive phase in the Indian Ocean Dipole (IOD) [Johnson 2020]. A positive IOD "is characterized by a dipole of warmer-than-average water in the western Indian Ocean and colder-than-average water in the eastern Indian Ocean [Johnson 2020].

Yet another factor contributing to global warming is the so-called "sudden stratospheric warming" (SSW), which happened "when temperatures in the stratosphere high above the South Pole the air began rapidly heating" [The air above Antarctica... 2019]. According to official data released by the Bureau of Meteorology, Australia experienced its hottest and driest year ever in 2019 [Doyle 2020].

High temperatures and droughts, under other favourable conditions, usually lead to forest fires over large areas in different parts of the world, and it is well known that deforestation not only leads to the releasing of stored carbon dioxide but also puts an end to carbon absorption, contributing significantly to climate change. Carbon dioxide is also released during the burning of fossil fuels. It should be emphasised that the risk of fires caused by climate change may increase deforestation, which may be accelerating global warming. This results in a new environmental threat.

3. Causes and effects of fires in Australia in 2019/2020

As rightly pointed out by the Climate Council – a leading Australian non-profit organization specialized in providing information on climate change, “For well over 20 years scientists have warned that climate change would increase the risk of extreme bushfires in Australia” [The fact about bushfires and climate change 2019].

Warnings about the ecological disaster caused by forest fires in Australia have also appeared in scientific reports and press releases (see Fig. 1). A bushfire occurs if the following factors occur together: a sufficient amount of fuel (vegetation) that is dry enough to sustain the fire, plus weather conditions favourable to the spread of fire and a source of ignition [The facts about bushfires... 2019]. These factors are linked to climate change. Fires are more likely in high temperatures, in drought conditions and are often caused by environmentally harmful human activity, which has become a major factor in global environmental change [The facts about bushfires... 2019]. During a single year, the number and size of fires depend on various weather phenomena, such as El Niño, while in the long term, it is the anthropogenic causes of climate change that are the most likely

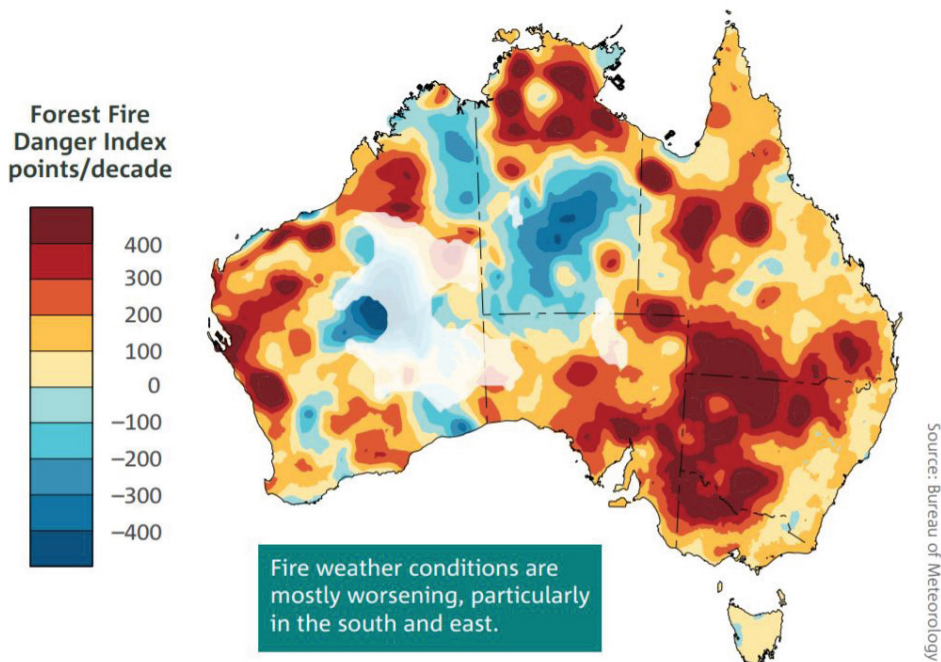


Fig. 1. Forest Fire Danger Index

Source: *State of Climate 2018*.



Fig. 2. Bushfires in Australia

Source: Lee 2020 (see: Australian fire pictures for publication without permission).

reason for the formation of so-called fire weather [What are the impacts... 2020] When describing the causes of fires, one has to mention the harmful effects of human activity. According to the Sydney Morning Herald, New South Wales police took legal action against 183 people in the 2019 season of bushfires and accused 24 people of intentionally setting fire to the bush [Media reaction... 2020].

Bush season fires 2019-2020 are widely considered among the most severe in history. Since September, fires spread to most of Southeast Australia after a period of extreme drought and record temperature [Media reaction... 2020].

In total, by January 8, about 10 million hectares (100,000 sq. km) of bush, forest and parks burned all over Australia and 28 people were killed, including four firefighters [Australia fires: A visual guide... 2020]. Professor Christopher Dickman revised his estimate of the number of animals killed in bushfires in New South Wales to more than 800 million animals; with national impact over 1 billion animals. [More than one billion animals... 2020] BBC News reported that tens of thousands of livestock were also probably killed and more than 2000 homes were destroyed [Australia fires: Almost 2,000 homes... 2020] On the Kangaroo Island “at least 89 homes were reduced to ash and 296 farm buildings destroyed” [Prideaux 2020]. The rate at which bushfires spread surprised all people in Australia including scientists specialized in biodiversity [Lee 2020, see Fig. 2].

In December 2019 and in the first days in January 2020, after the fires has burnt for several months and despite efforts of thousands of firefighters struggling to extinguish them, many still threatened to destroy small towns and caused damage to property and wildlife [Dunne, Gabbatiss, McSweeney 2020]. With the start of 2020, as a result of the incoming smoke from the fires, the air quality in the capital of Australia, Canberra, was the worst in the world. According to the Canberra Times, the air quality index was twenty times above a level deemed hazardous [Media reaction... 2020]. Australian fires were taking place on such

a scale that their effects were even felt outside its borders. Across the Tasman Sea in New Zealand, BBC News reported that smoke from Australia had turned the sky into an “eerie” yellow [*Media reaction...* 2020].

The fires in Australia were causing more than just local damage. The unprecedented conditions, including burning heat in combination with historic drought had led to the formation of an unusually large number of *pyrocumulonimbus* (pyrCbs) events [Seftor, Gutro 2020]. “PyroCbs are essentially fire-induced thunderstorms” [Seftor, Gutro 2020] and can be linked to the raging fires in Australia. They arise when ash, smoke and burning material are carried by hot air. “As these materials cool, clouds are formed that behave like traditional thunderstorms, but without accompanying precipitation” [Seftor, Gutro 2020]. These storms lead to further “fire storms, the dangerous atmospheric phenomena can worsen fires by generating intense winds, transporting embers, and striking lightning in yet- untouched regions” [Gibbens 2020]. PyroCbs carry smoke and ash about 16 km into the stratosphere [Seftor, Gutro 2020]. “Once it is in the stratosphere, the smoke can travel thousands of miles from its source, affecting atmospheric conditions globally” [Seftor, Gutro 2020]. The effects of these events, regardless of whether the spreading smoke causes warming or cooling, are being closely monitored by NASA specialists [Seftor, Gutro 2020].

4. The impact of recent catastrophic bushfires in Australia on tourism

The impact of climate change is particularly difficult to predict for such a sensitive branch of the world economy as tourism. In this case we are dealing with an extremely complex system of interactions – climate-nature-man – where each of these elements can affect one another [Czoch, Kulesza 2011]. The sensitivity of tourism lies in the significant dependence of its development on both climate and natural values [Czoch, Kulesza 2011]. In order to assess the potential impact of climate change on the development of tourism in Australia, it is necessary to emphasize the nature of the continent’s most important tourist assets, which include: holiday values, interesting landscapes and easy access to water and forests, numerous sightseeing opportunities as well as natural and cultural peculiarities (in the field of Aboriginal culture). When examining the impact of climate on tourism it is also important to remember that the quality and tourist values of a given destination are most often determined by its substantive value, uniqueness, landscape quality and safety.

Climate-induced changes in the natural environment may threaten the life and health of tourists, which may affect their decisions to visit particular tourist destinations. “Eco-tourism” based on natural, landscape and climate values, depends on weather conditions [Czoch, Kulesza 2011]. When analysing the impact of climate change on tourism, it should be emphasized that as a result of global warming natural values in some regions may deteriorate, adversely affecting the development of tourism and recreation. It is obvious that the growing frequency of extreme events, such as fires or droughts, will reduce the attractiveness of tourist destinations and the intensity of tourist traffic.

To answer questions related to the impact of global warming on tourism in Australia, it is important to provide its briefly characterisation. Tourism plays a significant part in Australia’s economy. In the financial year 2018-2019, Australia generated a total of AUD \$60.8 billion in direct tourism gross domestic product (GDP) [*The economic importance of tourism 2020*]. Tourism also directly employed 666,000 people [*The economic importance of tourism 2020*]. In 2018-2019, the country was visited by 9.3 million international visitors [*The economic importance of tourism 2020*]. The largest numbers of overseas visitors came from China, New Zealand and the USA [Australian Tourism Statistics 2020]. On 10 January 2020, “the United States warned its citizens to exercise increased caution when travelling to Australia, placing it on the same travel advisory level as Hong Kong and Papua New Guinea” [Snape 2020]. This decision can have serious consequences for Australia’s tourism, given the fact that the country is visited by 800,000 American tourists each year [Snape 2020]. As the fires kept spreading at the end of December 2019, Australia ran an advertising campaign in the US and UK led by the famous singer Kylie Minogue. However, in the face of the forest fire crisis, the campaign was suspended (although it cost AUD \$15 million) [*Tourism Australia pauses \$15 million... 2020*].

Tourists come to Australia mainly to see its extraordinary nature. They usually visit national parks and other natural areas that dominate the Australian tourism market for both local and international travellers. However, the fires have not only made it impossible to enjoy close encounters with nature in the national parks, but their effects have worsened the air quality even in cities, such as Canberra, Melbourne or Sydney.

Summer (December-February) is the most popular season for international arrivals, so financial losses incurred by tourism in the summer season 2019/2020 will be very large [Dunne, Gabbatiss, McSweeney 2020]. For example, “Kangaroo Island tourism was expected to fetch \$168 million in 2020 but local businesses are concerned that one of the island’s key industries is at risk of collapsing as tourists cancel bookings into April” [*Kangaroo Island businesses ... 2020*].

5. Conclusions

The above analysis has showed that there is a direct relationship between climate change resulting from global warming and tourism. It is estimated that climate change has increased Australia the risk of hot, dry weather by at least 30% [Ghosh 2020]. Climate change has undoubtedly caused catastrophic bushfires in Australia. Fires and the resulting large scale air pollution have become the reason why caution is required before travelling to endangered areas and why many tourists have cancelled their reservations in Australia. Kangaroo Island, Mallacoota, Blue Mountains and many other tourist destinations have become places of catastrophic destruction of wildlife including koalas, kangaroos and many other representatives of the Australian fauna. Future scenarios of the socio-economic development of the world and the increase in average temperatures and rainfall (predicted by IPCC climate models) have tried to determine the main trends/directions of change in the tourism sector in Australia. The Australian government, including Prime Minister Scott Morrison, disregarded warnings about the effects of global warming, basing energy production mainly on coal, which causes huge emissions of carbon dioxide into the atmosphere [Baxter 2020]. Losses incurred by the Australian economy and tourism as a result of destruction of the natural environment have not yet been fully assessed but undoubtedly they will reach billions of dollars. Some losses have already been estimated and the government will start paying compensation as soon as possible. However, it will take at least several months to rebuild damaged homes. Unfortunately, losses in the natural environment and, consequently the damage caused to Australia's image, cannot be made up. NASA's satellites photos of smoke from Australian fires indicate that the biggest problems have been noticed in New Zealand, where glaciers have turned brown [Irfan, Animashaun 2020]. By January 8, 2020, outside New Zealand, smoke had travelled around the Earth, even to South America, "turning skies hazy and causing colourful sunrises and sunsets". NASA scientists suspect that smoke will go around the world and return to the sky over Australia. [O'Kane 2020].

Most national parks in the southeast of the country have now been closed until further notice, including one of the biggest tourist attractions, the Blue Mountains National Park. To close the discussion on the effects of bushfires, it seems appropriate to quote an opinion of scientists and social science researchers who work in transdisciplinary climate change projects: "Although fires are natural in Australia, they're now occurring at an unprecedented frequency and intensity in areas that, historically, did not burn. This new regime does not allow the effective recovery of natural systems to their pre-fire state" [Bowman 2020].

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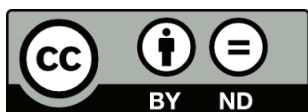
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Wpływ zmian klimatu na turystykę w Australii – studium przypadku w związku z pożarami w Australii na przełomie 2019/2020

Abstrakt. Głównym celem artykułu jest wstępna analiza wpływu pożarów krzewów australijskich na turystykę w sezonie letnim 2019/2020. Autorka omawia zagadnienia związane ze zmianami klimatu na świecie, a przede wszystkim w Australii. Analiza obejmuje przyczyny i skutki niedawnych katastrofalnych pożarów w Australii, ze szczególnym uwzględnieniem strat w sferze turystyki. Opisane zostały przyczyny zmian klimatu w Australii, które pociągają za sobą pożary lasów niszczące przyrodę i zaburzające życie kraju. Analiza skupia się głównie na tym, jak zmiany klimatu wpływają na środowisko naturalne, szczególnie na najpopularniejsze obszary o wartości turystycznej w Australii, tj. parki narodowe. Autorka przywołuje aktualne informacje na temat skutków strat spowodowanych przez pożary w Australii, zwłaszcza w sektorze turystycznym. Analiza wykazała, że istnieje bezpośredni związek między zmianami klimatu wynikającymi z globalnego ocieplenia a popytem turystycznym.

Słowa kluczowe: globalne ocieplenie, pożary buszu w Australii, turystyka



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