

URBAN ADAPTATION TO CLIMATE CHANGE AND RESIDENT AWARENESS. A POLISH PERSPECTIVE

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Summary

The development of urban areas over the last several decades has significantly contributed to climate change. The modern approach to spatial planning and land management responds to the adaptation of cities to changing climate conditions and the need for a liveable environment. The land use of new green spaces and the upgrading of the existing ones should include adaptation to the present and future climate conditions. Cities can adjust to climate change in many different ways. Over the years, the expansion of urban areas has generated a trend towards higher average temperatures than in rural areas, especially in densely populated urban centres with scarce vegetation where temperatures tend to be higher. City growth is detrimental to the natural environment and water circulation. Insufficient vegetation contributes to high air temperature in cities and urban heat islands. In addition, poor water retention and water infrastructure exacerbate urban droughts and floods. Therefore, efforts should be interdisciplinary and multi-faceted to achieve the best results. Adaptation to climate change faces in Poland multiple and diversified barriers. Hence the question: what is happening at the social level? Are residents of cities conscious of the problem, and do they know how to respond to it? What are the barriers concerning climate change? The paper investigates the public awareness of climate change in Poland. The results demonstrate that there is insufficient awareness of climate change in Polish society and a broad remedial measures are needed.

Keywords

Poland • public awareness • adaptation to climate change • modern cities

1. Introduction

The development of urban areas in recent decades has significantly contributed to climate change [Lima and Lopes 2017]. Urbanisation is a highly intensive global phenomenon - in 2018 55% of the global population already lived in cities [Data ONZ 2022], and the proportion continues to grow. This fact has some ramifications. Over the years, the expansion of urban areas has generated a trend towards higher average temperatures than in rural areas, especially in densely populated urban centres with scarce vegetation where temperatures tend to be higher. City growth is detrimental to

the natural environment and water circulation. Insufficient vegetation contributes to high air temperature in cities and urban heat islands. In addition, poor water retention and water infrastructure exacerbate urban droughts and floods. Impermeable surfaces and dense development areas continually grow in cities, causing surface runoff. These factors also affect the urban quality of life [Olczak et al. 2020].

Researchers have been studying climate change in the urban context for decades. The studies focus on drivers of change, the need for adapting cities to climate change, or sustainable urban growth policy [Jiang et al. 2017]. At the scientific level, the issue is undisputable. In terms of knowledge about climate change and its prevention, the key is to engage the global community through awareness-building because it tends to stay far behind science [Rahimi 2020].

Adaptation to climate change faces in Poland multiple and diversified obstacles. What is happening at the social level? Are residents of cities conscious of the problem, and do they know how to respond to it? What are the public awareness barriers concerning climate change?

2. Objective

The objective was to investigate and map the current state of understanding and awareness in Polish society regarding adaptation of cities to climate change. We conducted a small-sample pilot study to pave the way for a large-scale effort, and to test and evaluate a tool that can potentially be used in a proper study [Grzeszkiewicz-Radulska 2012]. Insight into the current public knowledge is crucial for planning education, information, and pilot measures to encourage residents to take action on a large scale.

3. The research method

The paper is based on a survey. The additional literature review focused on climate change, its consequences for cities, and activities aimed at adaptation to climate change in Europe and Poland. Special focus was put on the awareness of Polish society of the measures taken by the cities to mitigate climate change and of the obstacles they have to overcome. We used a survey to investigate public awareness of climate change and related actions (Fig. 1). It involved 160 respondents who were asked about climate change in urban areas, resident awareness, and their good practises. The questionnaire consisted of twelve questions: eleven close-ended and one open-ended. It was distributed through social media, such as Facebook, LinkedIn, and Instagram, among randomly chosen thematic groups. The study was conducted in Poland and only among Polish users of social media where the questionnaire was shared. The results were compiled in order to draw conclusions on the public awareness in Poland. In addition, they were used to identify barriers to the adaptation of Polish cities to climate change.



Source: Authors' own studies

Fig. 1. Research methodology diagram

The survey was conducted from 8 October to 20 November 2021. The first part covered sociodemographic characteristics: age, gender, and domicile. The questionnaire included three categories of questions: personal data, general climate change knowledge, and knowledge on adaptation to climate change (Fig. 2).

General Data		
Age	Gender	Domicile
<p>Knowledge about climate change adaptation</p> <p>Do you know what activities are carried out to adapt Polish cities to climate change?</p> <p>Is there a document / project concerning examples of good practices related to solutions preventing negative climate changes in your place of residence?</p> <p>What solutions are used to prevent negative climate changes in your place of residence?</p>	<p>General knowledge on climate change</p> <p>Do you know what climate change is?</p> <p>Have you experienced the negative effects of climate change?</p> <p>Do you think climate change is reversible?</p> <p>Do you think that it is possible to prevent climate change?</p> <p>Do you think that it is possible to reduce the negative effects of climate change?</p>	

Source: Authors' own studies

Fig. 2. Questionnaire template

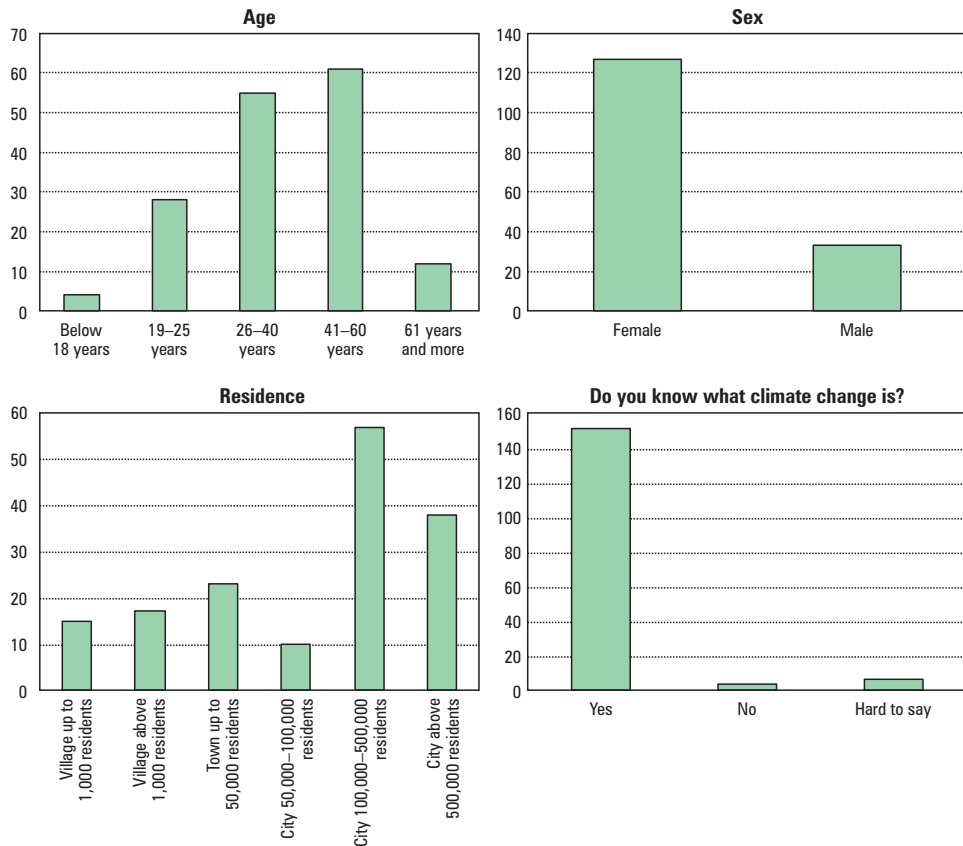
4. Results

After the fall of communism in the 1990s, in many Eastern European Countries there were attempts to develop the tools for environment restoration [Herrschel and Forsyth 2001]. In Poland, research on social problems in environment protection was conducted in the 1980s and 1990s. Poland's international commitments regarding climate change date back to 1994, to the United Nations Framework Convention on Climate Change [Ministerstwo Środowiska 2003]. It was 20 years after the notion of 'global warming' was formulated, and an exhaustive effort to look into the consequences of climate change had started [Błażejczyk and Żmujdzka 2013]. It is hard to overestimate its value because environmental awareness, as part of public awareness, is understood as 'the attitude of humans to the natural environment, a system of information and beliefs in this regard, and a system of values one is guided by in their actions concerning the environment' [Kielczewski 2001]. In more broad terms, it affects the approach to the natural environment as a place where people (society) live and grow [Kłós 2015]. This aspect is vital because natural resources are defined as a public good [Blusz et al. 2015]. In his research from the turn of the twenty-first century, Burger identified categories of environmental awareness of Polish society. One attitude was environmentally conscious and the other environmentally neutral. The former is self-explanatory and describes those in favour of general environmental protection and care. The other attitude is less homogeneous and features diverse positions. The subgroups include a group that is for environmental protection but does not display an environmentally conscious attitude, an indifferent group who are not interested in the issue of environment protection and do not consider care for the environment as an important matter, a group that is aware of environmental issues but reluctant to implement actions, and a group of informed opponents of natural environment protection [Burger 2005]. Environmental awareness among Polish people is investigated each year by the Public Opinion Research Centre [Public Opinion Research Center 2022]. Regular surveys provide the best value because they reflect changes in public attitudes. Research on specific issues that can reach deeper is important as well. Knowledge of the environmental awareness of society is crucial for creating, revising, and reinforcing legal solutions to favour environmental actions through education and teaching [Stefaniuk 2021]. A 2019 survey among young Poles, aged 15 to 24, concerning the anthropogenic impact on climate change confirmed that the young generation perceived climate change consequences as a global issue, but much less as a national problem and even less a regional one [Woźniak and Saj 2019].

The study shows that most of the respondents were women living in a city (100,000 to 500,000 residents) and people aged 41–60. Nearly 90% of the respondents claimed they knew what climate change was and that it could be counteracted. However, more than half of the respondents did not know what actions were taken to adapt cities in Poland to climate change. Only 50 out of 160 respondents did not experience any negative impact of climate change such as flash floods, floodings, urban droughts, high wind damage, or others. The opinions regarding the reversibility were distributed equally. 39% of respondents believed they were irreversible, and 37% thought they were revers-

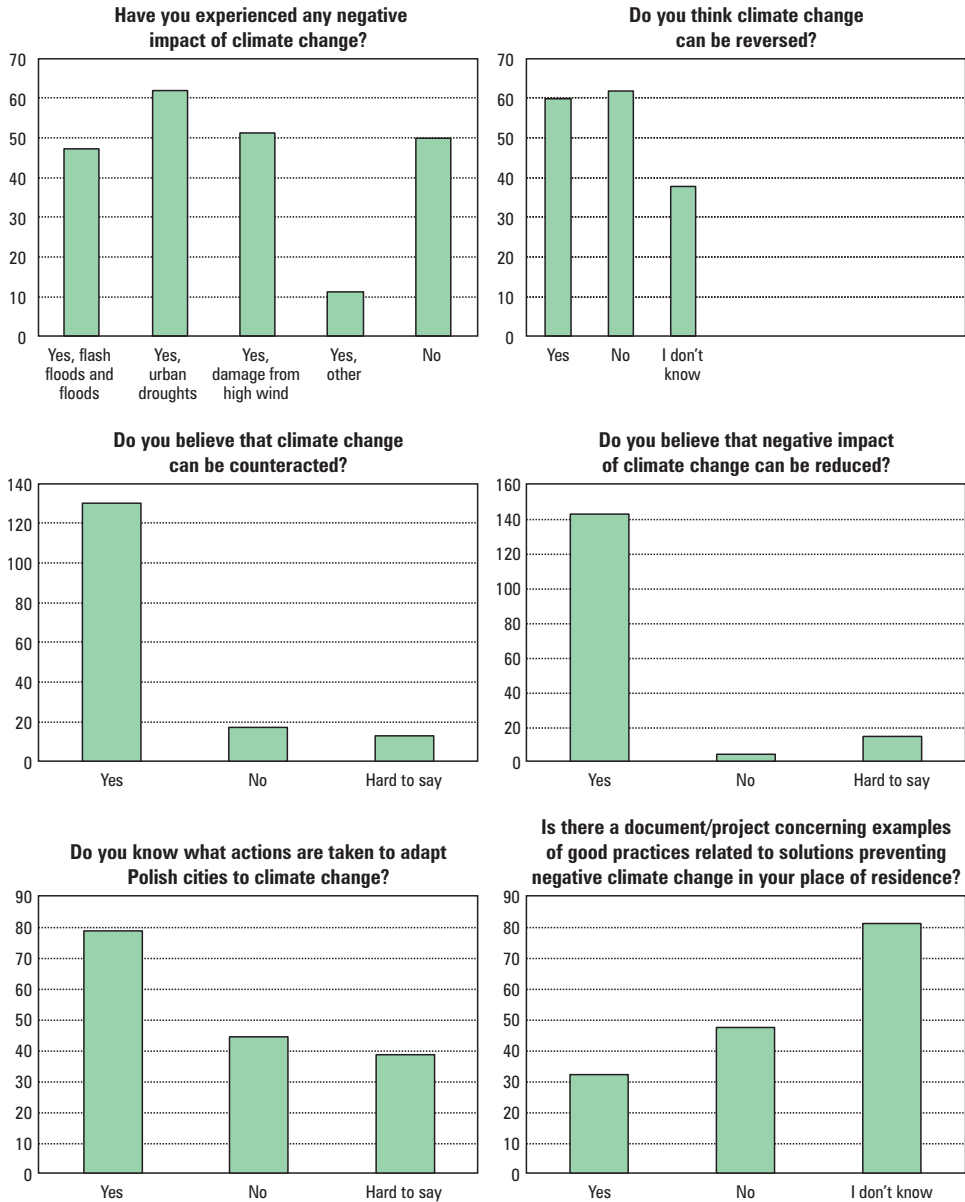
ible. There was a positive response to the question ‘Do you believe that climate change can be counteracted?’, with 81% answering ‘yes’, and 89% believing it possible to reduce the negative impact of climate change. However, less than half of the respondents confirmed they knew ‘what actions are taken to adapt Polish cities to climate change’. Over 51% of the respondents did not know whether there was a document or project with examples of good practices related to preventing negative climate change in their place of residence, while only 20% were familiar with such documents.

The most common response to the open question ‘what means to prevent negative climate change are applied in your place of residence?’ was ‘replacement of coal-fired boilers’ with 51 responses. ‘Recycling’ and ‘renewable energy sources’ came in second with 21 responses. This was followed by increasing green areas in cities, free public transport, bike-sharing schemes, dikes, energy-saving, electric cars, campaigns promoting efficient water and energy use, passive houses, pollution control with UAVs, and modern wastewater treatment plants (Fig. 3).



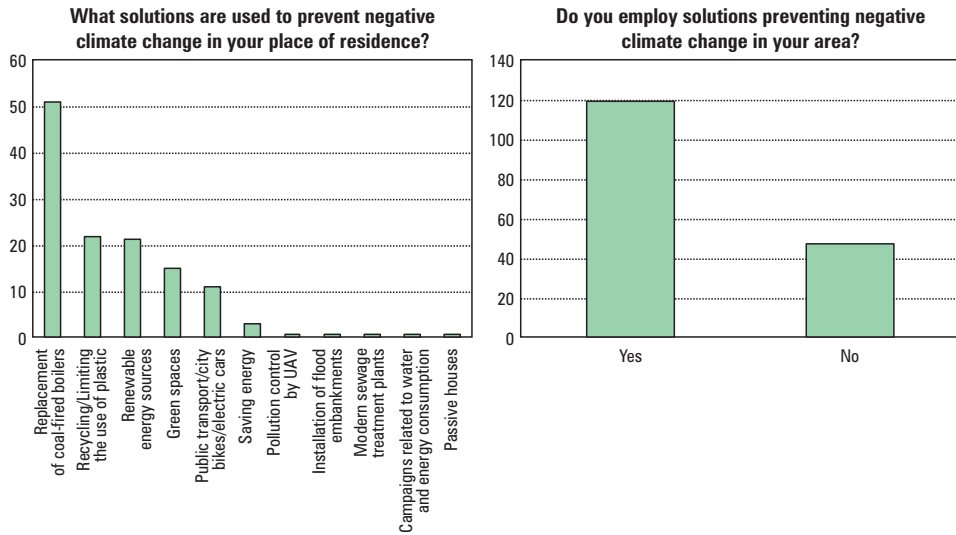
Source: Authors' own studies

Fig. 3. Survey results



Source: Authors' own studies

Fig. 3. cont.



Source: Authors' own studies

Fig. 3. cont.

4.1. Commentary on the results

The results are far from optimistic. The fact that only 32 people out of 160 knew about documents with examples of good practices for climate change prevention suggests that such documents are insufficiently promoted in Poland. The poor knowledge of climate change in Poland may be caused by lack of media coverage on relevant information. In a study by Kundzewicz (2017), the Polish and Norwegian media were compared concerning the presence of one of the central IPCC (Intergovernmental Panel on Climate Change) reports. The number of articles in the Polish media was nearly six times lower than in Norway [Kundzewicz et al. 2017].

One concerning result is that 72% of the respondents believed they were engaged in a broad effort to prevent the negative impact of climate change in their areas. This most likely indicates that they thought they were doing more than they were actually doing. In reality, some of the actions taken, such as boiler replacement or selective waste collection, were mostly driven by financial incentives, rather than by care for the environment.

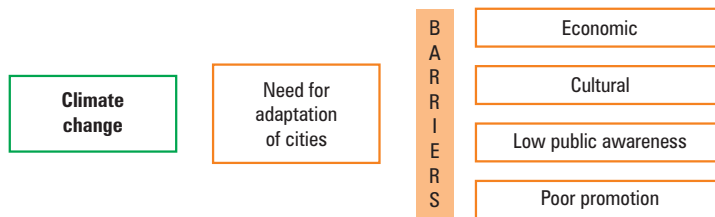
5. Discussion

Barriers to adapting to climate change can be linked to Poland's post-socialist development lag compared to Western European countries, cultural factors, or a long and well-established dependence on fossil fuel mining, particularly in Lower and Upper Silesia. These circumstances lead to substantial CO₂ emissions in Poland. Studies show that electricity in Poland is produced mainly from coal. A study from 2017 set the carbon

footprint of Poland at 7.25 t of CO₂ per person. Poland and Norway signed the United Nations Framework Convention on Climate Change in 1992 and the Kyoto Protocol in 1998, committing to reduce greenhouse gas emissions. In 2008, Norway declared achieving greenhouse gas neutrality in 2030, while Poland continues to produce most of its energy from coal [Kundzewicz et al. 2017].

There is also a significant group of ‘climate sceptics’. Another issue on the road to managing the consequences of climate change is the economy of Poland, which is founded mostly on fossil fuels [Kundzewicz et al. 2017]. Poland relies heavily on the mining industry. Evidence of this can be found, for example, in the refusal to stop mining brown coal in the Turów mine despite protests from NGOs and the Court of Justice of the European Union’s order to stop extraction immediately. Poland did not conform and has been fined [Business Insider Poland 2021]. Another problem was identified in Upper Silesia where hard coal is extracted from deep deposits, which is economically controversial compared to the cost of extraction of brown coal in open-pit mines. It leads to unprofitable mining.

Furthermore, Polish society is very sceptical about nuclear energy for cultural reasons. The distrust caused by the Chernobyl accident in Ukraine in 1986 is deeply rooted. According to Eurostat, 24.6% of electricity in the European Union is produced in nuclear power plants [Nuclear energy statistics]. Poland is currently planning its nuclear energy path. The first reactor is scheduled for 2033 [Piórkowska et al. 2021]. However, it is not the Poland’s first attempt at nuclear power. The previous ones failed due to public scepticism. The question is: will it work this time? Is the public awareness of climate change sufficient to outweigh nuclear scepticism (Fig. 4)?



Source: Authors' own studies

Fig. 4. Barriers to actions to adapt cities to climate change in Poland

6. Conclusions

We have no decisive influence on climate change, but as a society we can grow towards climate neutrality. As has been shown, the climate change awareness in Polish society is insufficient. It is necessary to educate all generations using age-specific methods. As the survey results have shown, society exhibits little awareness of climate change and does not consider adaptation to climate change a priority. Only a small part indicates signs of environmental care. Moreover, most of these attitudes result from a potential punish-

ment for noncompliance with selective waste management or recycling obligations, for example. Hence, it is important to raise public awareness and to implement appropriate actions. In light of advancing climate change, it is necessary to take actions to improve public awareness and introduce wide environmental solutions at different scales and in diverse domains. Effort should be grounded in education and public awareness building.

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