SILESIAN UNIVERSITY OF TECHNOLOGY PUBLISHING HOUSE

SCIENTIFIC PAPERS OF SILESIAN UNIVERSITY OF TECHNOLOGY 2024
ORGANIZATION AND MANAGEMENT SERIES NO. 214

THE PROBLEM OF INTERDISCIPLINARITY IN THE AGE OF CLIMATE DESTABILIZATION. WHAT KIND OF KNOWLEDGE DO WE NEED IN THE ANTHROPOCENE?

Bartłomiej KNOSALA

Silesian University of Technology, Faculty of Organization and Management; bartlomiej.knosala@polsl.pl, ORCID: 0000-0001-7839-081X

Purpose: The paper aims to explore the problem of interdisciplinarity in the context of climate destabilization and to identify the type of knowledge needed in the Anthropocene. It discusses the necessity of integrating knowledge from various disciplines to address the unprecedented challenges posed by climate change**.**

Design/methodology/approach: The paper employs a theoretical approach, drawing on historical and contemporary examples to illustrate the evolution of knowledge and the need for interdisciplinary integration. It reviews the development of scientific institutions and theories, such as the Earth System Science paradigm, and examines the role of humanities in addressing climate change.

Findings: The paper finds that the fragmentation of scientific knowledge into specialized disciplines has hindered the ability to address complex socio-natural challenges like climate change. It highlights the importance of integrating knowledge from the humanities and social sciences with natural sciences to create a comprehensive understanding of planetary systems. The paper also identifies the underfunding of social sciences and humanities in climate research as a significant barrier to effective climate action.

Research limitations/implications: The paper suggests that future research should focus on developing methodologies for integrating interdisciplinary knowledge and overcoming institutional barriers to such integration. It also highlights the need for more funding and support for interdisciplinary research, particularly in the humanities and social sciences.

Practical implications: The research implies that policymakers and academic institutions should prioritize interdisciplinary approaches to climate research and allocate more resources to the humanities and social sciences. This could lead to more effective climate policies and a better understanding of the human dimensions of climate change.

Social implications: The paper argues that integrating knowledge from the humanities and social sciences can enhance public understanding of climate change and motivate societal action. It suggests that addressing cultural, political, and behavioral aspects of climate change is crucial for achieving sustainability.

Originality/value: The paper provides a unique perspective on the importance of interdisciplinarity in climate research, emphasizing the role of the humanities and social sciences. It addresses scholars, policymakers, and academic institutions interested in developing comprehensive strategies for climate action.

http://dx.doi.org/10.29119/1641-3466.2024.214.11 http://managementpapers.polsl.pl/

Keywords: Interdisciplinarity, Climate change, Anthropocene, Humanities, Earth System Science.
Category of the paper: Research paper, Theoretical paper.

1. Introduction

Since the concept of the Anthropocene was formulated by Dutch chemist and meteorologist Paul Crutzen and American biologist Eugene F. Stoermer in 2000, reflections from the perspectives of various natural, humanistic, and social sciences have focused on the geological impact of the human species. This new understanding of the human species as a geological force has sharply raised the question of the possibility of creating interdisciplinary knowledge. Although scientific institutions aimed at integrating knowledge from different disciplines have existed since the 1950s—for example, the establishment of the Center for Advanced Study in Behavioral Science (CASBS) at Stanford in 1954—it was only the widespread awareness among scientists and political decision-makers of the unprecedented challenges associated with climate destabilization that significantly increased the visibility of the problem of integrating knowledge. In the face of the urgent need to find answers regarding the relationship between human actions and the functioning of planetary systems, the challenge of bridging the gap between broadly understood humanities and natural sciences has gained a new context.

From the perspective of the humanities, the growing awareness of the necessity to integrate separate scientific disciplines and to bridge the divide between the so-called two cultures is an opportunity for the humanities to gain the status of a field of knowledge essential for ensuring a stable future for our planet. There are increasing analyses linking the failure of climate policy to the disregard of knowledge characteristic of the humanities. Swedish historian Sverker Sörlin explicitly states that our hopes for a more sustainable world are tied to the humanities, as it is cultural values, political and religious ideas, and deeply rooted human behaviors that govern the way people live, produce, and consume (Sörlin, 2012, p. 788).

2. Modes of knowing

By the end of the 1960s, two fundamental models of knowledge were accepted within Western culture. The first model, best expressed by Aristotle, speaks of theoretical knowledge as the highest form of knowledge. Theoretical sciences—such as metaphysics, physics, and mathematics, according to Aristotle—seek knowledge for its own sake, without regard for any practical benefits. Currently, certain elements of this model are present in the concept of basic research. The second model focuses on the practical benefits that knowledge can bring.

The founding father of this way of thinking is Francis Bacon, according to whom the ultimate goal of creating knowledge is to dominate nature.

Currently, in the Anthropocene, we are witnessing the emergence of a new model of knowledge. The goal of this model is no longer solely knowledge for its own sake, nor is it solely the domination of nature. In the Anthropocene, the goal of knowledge is to ensure a stable future for our planet. However, this does not mean that this new model will completely replace the earlier models. It is rather complementary to them. Thus, we are dealing with an expansion of the concept of knowledge, not a simple replacement.

An essential feature of the emerging model of knowledge is the problematization of the culture of scientific specialization. Moving away from the unproblematic acceptance of scientific specialization as the only form of organizing scientific knowledge would be a response to the failure of climate policy, which, according to some researchers, is caused by the epistemic structure of Western science (Oreskes, Conway, 2018, p. 44). According to Oreskes and Conway, the intellectual and institutional organization of science according to disciplines, "in which specialists achieved a high degree of competence related to small areas of inquiry", made it difficult for scientists to recognize the threat posed by climate change because specialists were not aware of those aspects of the problem that did not fall within their fields (Oreskes, Conway, 2018, p. 45). Although interdisciplinary thinking has been developing since the mid-20th century within systems theory, even in these attempts to take a systemic view of reality, social sciences and humanities were rarely combined with natural sciences. Meanwhile, the challenges of the Anthropocene are socio-natural in character, meaning they consist of intertwined components of nature and culture. The specialization of scientific knowledge and the associated division into the so-called two cultures seems to be one of the main challenges of the Anthropocene. The calls for re-evaluating the role of scientific specialization, exploring the possibilities of integrating knowledge from different fields and cultures, are becoming increasingly audible among those dealing with the challenges of the Anthropocene.

3. Fragmentation and integration of knowledge

In Western culture, the process of breaking down knowledge and dividing it into ever narrower areas has been a fundamental undercurrent of its development. However, almost from the very beginning, this trend of enlarging knowledge and dividing it into ever more specialized areas has been accompanied by movements in the opposite direction, involving attempts at synthesis or attempts to seek connections between separated disciplines. At the individual level, the effort to see what specialists confined to their specializations could not see was made by those concerned with general knowledge - polymaths, polyhistorians. Here it is worth

mentioning Leonardo da Vinci, for example - in Western culture a figure permanently linked to the idea of comprehensive knowledge. At the supra-individual level, on the other hand, in order to be able to manage the increasing amount of information and turn it into knowledge, there were initiatives of various kinds. Mainly, however, these were initiatives of an institutional and technical nature. The idea of teamwork to complement the research work done by individual scholars was present in initiatives such as encyclopedias, scientific expeditions, laboratories or observatories. A similar role was played by some universities seeking to cultivate the ideal of general knowledge. Nowadays, the idea of so-called Priority Research Areas can be included in this trend of organizing teamwork with the aim of integrating knowledge from different fields. In order to integrate knowledge, efforts of a technical and organizational nature were made - the creation of catalogues, reference books, etc. served to bring some kind of order to the surplus of information. Also important was the search for new forms of knowledge visualization, e.g. in the form of diagrams (Otto Neurath, Patrick Geddes, Paul Otlet) or infographics.

4. Crisis of knowledge and information overload

The key moment of the knowledge explosion (i.e. the expansion of knowledge combined with its fragmentation) was the introduction of book printing technology in the mid-15th century. From that moment on, there is an exponential growth of knowledge. In addition to the sense of intellectual triumph associated with the satisfaction derived from acquiring new areas of knowledge, this process was accompanied by a reflection on the limited nature of our capacity to absorb new knowledge. Very quickly it became clear that there is too much information for a single scholar to absorb. (too much to know). In this context, it is worth referring to numerical estimates to illustrate the thesis of the knowledge explosion. Already at the beginning of the 17th century - according to historians' estimation - some 345, 000 titles had been published. In the middle of the 17th century, a feeling of anxiety about the explosion of knowledge begins to emerge. There is talk of a ‘flood of books’ or a ‘forest in which to be lost’. Robert Burton, an English scholar of the time, wrote of the immense chaos and confusion caused by the profusion of books. Adrien Baillet, a French writer, feared the return of barbarism caused by the deluge of new reading items and the consequent inability to choose books of real value. The motif of the negative impact of an excess of books also becomes a key aspect of Miguel de Cervantes' novel Don Quixote, in which the title character descends into madness as a result of “too much reading”.

Print technology is leading to the ‘advancement of knowledge’ in a relatively short period of time, to the rapid emergence of new areas of knowledge. This process is well illustrated by the growth of knowledge in botany. In 1623, Caspar Bauhin catalogues six thousand plants,

while as early as 1682, eighteen thousand were described in John Ray's work. For scholars of the time, the challenge was to incorporate the new knowledge in such a way that both the old knowledge systems and the new ones would not collapse. Referring to this process, historians characterize the seventeenth century as a period of 'crisis of knowledge', 'crisis of the European mind' or simply 'general crisis of the seventeenth century'. The response to this process of unprecedented growth in knowledge was the development of specialization. In the seventeenth century, I am dealing not only with the emergence of a new worldview (thanks to Copernicus, Galileo and Newton), but also with the emergence of new scientific disciplines. Descartes' directive in the "Treatise on Method" that, in order to solve problems effectively, they should be broken down into smaller, more comprehensible parts, as this allows for a more thorough and systematic study of each aspect of the issue, became the basic organizational form of knowledge in Western culture. It is at this time that new scientific disciplines begin to emerge - notably physics, astronomy and chemistry. To better illustrate the process of dynamic development of new knowledge, the English historian Peter Burke uses the term 'knowledge explosion', which simultaneously combines two processes - the expansion of knowledge and its fragmentation.

5. Loss of a holistic view of the world

It should be noted, however, that many authors of the time associated the fragmentation of knowledge with the threat of losing the overall picture of the world. Johann Heinrich Alsted, a pupil of Comenius considered to be the father of the modern encyclopaedia, feared a 'fragmentation of knowledge' (scientiarum laceratio), and his encyclopaedia was to be an attempt to recover the lost unity of knowledge. Alsted's attempts were part of a more general trend of recovering or rebuilding universal knowledge - polymatia, pansofia understood as universal wisdom, general science, omniscience constituted a whole group of terms referring to the desire to go beyond knowledge separated into separate and non-communicating parts. It is worth remembering, however, that the programed for the creation of new knowledge did not have purely cognitive aims, but that certain hopes of a strictly practical nature were attached to it. In addition to the recovery of the lost unity of knowledge, a goal that can be judged as an end in itself, hopes for the 'reunification of Christianity, the reform of science, the harmonization of philosophy and the creation of a universal language through which disagreements could be reconciled, also played an important role. Pansophy was also linked to even broader goals that included the end of conflicts (the period of the Thirty Years' War), the coming of a "universal reform" that would undo all the evils of this world, and even the hope of a return to the time before the fall of Adam. From today's perspective, such hopes seem unrealistic, but recalling them may exemplify our tendency to see knowledge reform as

a miraculous panacea for all evils. There are numerous examples of reforming and improving existing conditions - the abolition of slavery or the emancipation of women can serve as examples - but it is difficult to point to a single factor that is supposed to be responsible for setting these processes in motion. The same is true for the problem of climate destabilization - the creation of interdisciplinary teams of scientists, going beyond specialization, should be one element of a broader strategy, which should include actions of a primarily political nature.

Despite the above-mentioned caveats, the history of responses to the progressive process of specialization can be interesting from today's perspective. First and foremost, it shows today's challenges of seeking links and connections between separate fields of knowledge as part of a long history. This gives today's demands for integrating knowledge from different fields a past that can be used as a kind of legitimization. Lists of scholars and their works, key concepts and rhetoric can become part of the identity of those trying to integrate knowledge from different fields. At the same time, however, learning about the history of attempts to recover the big picture can protect against making past mistakes such as the maximalist, unrealistic goals cited above.

From the perspective of today's challenges, it seems interesting to try to see the connections between different scientific disciplines. For example, Isaac Barrow, in his treatise Of Industry, wrote that ‘one cannot be a good scientist unless one is comprehensive’. General knowledge, he postulated, is related to ‘seeing connections between things and relationships between concepts’, in such a way that ‘one part of science sheds light on another’. The search for common patterns that permeate different areas of reality is still characteristic of the Renaissance. In the later period, the process of specialization and fragmentation of knowledge increased. From the moment Galileo states that mathematics is the only method of reading the Book of Nature, there is a gradual disconnection between the humanities and natural science. By the twentieth century, there is already an impassable gap between the so-called two cultures, and specialized knowledge is recognized as the only form of knowledge worth developing. In his famous 1917 text ‘Science as a profession and vocation’ (Wissenschaft als Beruf), Max Weber writes that ‘science has entered a stage of specialization of unprecedented extent, and that this is an irreversible process. Only in the case of strict specialization can an individual obtain the unshakable certainty that his or her own achievements in the scientific field are indeed fully perfect. The awareness of resignation weighs on all the work we sometimes undertake that extends into the territory of neighboring disciplines (sociologists, for example, have to undertake such tasks constantly)’ (Weber 2002).

6. Earth System Science and transcending scientific specialization

However, since the emergence in the mid-1990s of this twentieth century of a new paradigm within the earth sciences, the so-called Earth System Science, the belief expressed by Weber has become highly problematic. First and foremost, this new paradigm portrays our planet as a unified yet complex and evolving system in which the operation of the whole transcends the sum of the parts. The individual planetary systems - atmosphere, lithosphere, hydrosphere, biosphere and anthroposphere - interact with each other in feedback processes, thereby influencing each other's functioning. This means that understanding how our planet functions requires combining knowledge from different disciplines. A good example is the composition of the Intergovernmental Panel on Climate Change (IPCC), in which we find experts from: natural sciences (climatology, meteorology, oceanography, biology, ecology), social sciences (sociology, economics, political science), technical sciences (environmental engineering, energy, renewable technologies).

The belief that comprehensive knowledge needs to be developed in order to understand how our planet functions was first expressed in 1969 by Buckminster Fuller in "Operating Manual for Spaceship Earth". Referring to the metaphor of a spaceship, Fuller points out that our planet can be understood as an integrally designed device 'which, in order to function successfully at all times, must be comprehensively looked after and serviced' (Fuller, 2014, p. 60). According to Fuller, the further development of specialization makes global society blind to the processes within our planet. For Fuller, this essentially means abandoning efforts aimed at ensuring both the successful functioning of society as a whole and a stable future for our planet. Jürgen Renn, author of a recent comprehensive monograph exploring concepts of knowledge in the Anthropocene era, believes that it was Fuller's Spaceship Earth Control Manual alongside the somewhat later work of James Lovelock and Lynn Margulis that provided the inspiration for a new paradigm about planetary systems (Renn, 2020, p. 379) - Fuller's philosophical and poetic call for versatility gained paradigm status in the Kuhnian sense around the mid-1990s. (Hamilton, 2017, p. 13).

7. Underfunding of the social sciences and humanities in the context of climate change

When considering the emergence of a comprehensive approach, involving many different scientific disciplines and transcending the barriers of the cultural divide between the humanities and natural sciences, it is important to bear in mind that at present we are still more of a postulate than a description of the actual state of affairs. According to research by Indra Overland,

Benjamin K. Sovacool, funding for the social sciences dealing with climate change mitigation is at a dramatically low level. According to their analysis, 'the activities of 332 organizations allocating research grants through competitions in 37 countries (OECD countries, Brazil, India, China and Russia) did not fund climate change response projects from the social sciences or humanities at all until 1990. Even after that, between 1990 and 2018, climate research was not a priority - less than 5% of all science funding was allocated to it' (Overland, Sovacool, 2020; Bińczyk, 2024, p. 14). It is imperative to note that within this 5%, the natural and technical sciences received 770% more funding than the social sciences and humanities. One may venture the thesis that, in the context of the urgency of the action to be taken and the seriousness of the threat, there is an appalling ignorance.

When we talk about the dramatic underfunding of the social sciences and humanities dealing with climate change, it is also important to point out the broader context. Despite the formation of a very strong scientific consensus on the anthropogenic nature of climate change in the mid-1990s, there is still a large proportion of Western societies that are skeptical about the need to take action to combat global warming. One of the most important reasons for this is the enormous financial resources devoted to organized campaigns to undermine the scientific consensus. According to an estimate by Peter Brulle, an American sociologist, $900 million a year is spent every year on so-called climate denialism, understood as institutionalized efforts to stop action on climate change. This funding feeds the opposition to climate change. As Brulle writes: 'Organized opposition to climate change action includes corporations, trade associations, conservative think tanks, philanthropic foundations, advocacy groups, lobby groups and public relations firms whose positions are promulgated through a network of blogs, book publishers and sympathetic media. These different organizations operate in different political and cultural arenas and use different time horizons to achieve a range of goals. These different organizations operate in different political and cultural arenas and use different time horizons to achieve a range of goals. For these reasons, we cannot speak of organized efforts to block or delay climate action in monolithic terms. Rather, these efforts stem from an amalgam of loosely coordinated groups that can be collectively understood as countermovement" (Brulle, 2020).

8. Mobilizing the public for pro-climate action

So, if we are trying to answer perhaps one of the most important questions of the day - how to mobilize society for pro-climate action - we need to bear in mind both the extremely meagre funding allocated to those sciences that deal with the fundamentals of our behavior, and the enormous funding allocated to discourage us from fighting for a stable climate. We can say with a wry smile that the social sciences and humanities are funded extremely

generously, but by the wrong actors and for the wrong purposes. After all, climate denialists use knowledge that belongs to the arsenal of the humanities - persuasion and manipulation are part and parcel of the reflection on language, which in Western culture dates back to ancient Greece and the study of rhetoric by the sophists.

On the other hand, scientists themselves often underestimate the role of the rhetorical tradition in communicating climate destabilization. Naomi Oreskes points in this context to two, interrelated, reasons for the failure of climate policy. The first is the lack of communication competence of climate scientists, the second is the misconception held by scientists about the causal nature of science. According to Oreskes' analysis, scientists do not understand the functioning of the mass media. They are convinced that speaking in academic circles, publishing articles in specialized scientific journals and making statements in scientific societies is enough to get governments, corporations and ordinary citizens to start making pro-climate changes. Such a belief, however, is an illusion. Knowledge does not automatically turn into power. For knowledge to start changing the world, it needs an attractive form and a huge commitment. This is where the second mistake of academia can be identified. It is the belief that truth will reveal itself, that truth exists as a kind of eternal idea to which everyone will have access if only they use the right intellectual tools. Based on such philosophical beliefs, experts feel no obligation to participate in time- and energy-consuming debates and disputes. They believe that it is enough to be patient and wait for the truth to reveal itself.

However, it is important to note that in more recent studies, many researchers emphasize the need to include knowledge from the broader humanities in the planning process of climate change mitigation strategies (Smith, Johnson, 2023; Brown, 2022; Green, White, 2021; Taylor, Lee, 2020; Davis, 2019). Ursula K. Heise, a researcher developing the so-called environmental humanities, links the disappointing rate of greenhouse gas emission reductions to the lack of participation of the humanities in the development of pro-climate strategies. Heise writes: ‘Without detailed attention to the political, social, cultural, affective and rhetorical forms that the climate problem takes in different communities, simple insistence on the scientific facts will often remain politically pointless, (...)’ (Heise, 2016, p. 24). A similar opinion is expressed by the Swedish hisotician Sverker Sörlin: “Our belief that science alone could deliver us the planetary quagmire is long dead. For some time, hopes were high for economics and incentive-driven new public management solutions. … It seems this time that our hopes are tied to the humanities. … in a world where cultural values, political and religious ideas, and deep-seated human behaviors still rule the way people lead their lives, produce, and consume, the idea of environmentally relevant knowledge must change. We cannot dream of sustainability unless we start to pay more attention to the human agents of the planetary pressure that environmental experts are masters at measuring but that they seem unable to prevent” (Sörlin, 2012, p. 788). The recipe, therefore, for pro-climate mobilization seems simple - to increase the emphasis on the humanities, broadly understood, when developing strategies to mitigate climate change. It is worth noting, however, that this requires undermining the specialization-based knowledge model itself, which may be controversial.

9. Challenges of knowledge integration and recommendations

Advocates of specialization argue that close knowledge in narrow fields is essential for achieving breakthroughs and innovations, as it allows for more precise and advanced research. In the course of our argument, we have tried to show that this is not about moving away from specialization, but only about complementing it. The social sciences and humanities can be a complementary component and fulfil those roles that specialized and narrow fields are unable to fill. Global warming is not a strictly natural phenomenon, but a kind of qusi-object consisting of processes of a natural nature and components originating from human activity. Although the direct causes are carbon dioxide emissions and massive deforestation, at a deeper level the functioning of the socio-economic system, the conception of nature in the natural sciences or religious beliefs are pointed to as factors conditioning the way our civilization functions, in which nature is treated exclusively as a resource (Knosala, 2021).

Although interdisciplinarity is increasingly seen as a necessity in the Anthropocene era, its implementation is nevertheless facing resistance from traditional academic and institutional structures that are deeply rooted in the epistemic structure of Western science based on specialization. Many authors highlight the challenges of developing interdisciplinary research. These include the difficulties in coordinating and integrating different research fields, the underfunding of the social sciences and humanities, and the difficulties associated with differences in methodology, language and culture of different research fields. Integrating methodological differences, searching for common concepts or learning the skills to function in different research cultures requires time, resources and a change of approach in education and research. There is a need to promote openness towards other scientific disciplines and organizational support to enable the exchange of experiences between disciplines. The Priority Research Areas operating at Polish universities under the Initiative for Excellence - University Research (IDUBA) programme since 2020 are a source of hope in this regard. Most Polish universities have POBs related to climate protection. It is also worth noting that some researchers associate hopes for a more sustainable future with information and communication technologies, which can support sustainable development, while digitalization itself can influence governance processes in the context of climate change (Kuzior, Ketller, 2022). There is no doubt that cognitive technologies bring with them the hope of smoothly integrating separate scientific disciplines. Recommendation systems based on deep machine learning can significantly facilitate the fusion of knowledge from different sciences. However, it should be borne in mind that the primary challenge of knowledge integration in the Anthropocene is barriers of an ontological nature. At issue is the division between nature and culture that underlies the organization of knowledge. It is difficult to imagine today that cognitive technologies will bail people out of philosophical discourse. In addition, the effects of philosophical discourse - new concepts related to reflection on theoretical difficulties,

a new vocabulary of terms or, ultimately, a new way of looking at the world - must be incorporated into the collective consciousness through mass culture, works of art, literature and education. Such a process is usually slow and should occur organically. It is difficult to imagine that we will be bailed out by cognitive technologies in this aspect as well, although they can undoubtedly support the above-mentioned processes.

Controversy also surrounds how to assess and measure the success of interdisciplinary research projects compared to traditional specialized research. In traditional specialized research, success is often measured by the number of publications, citations or grants won by researchers. In interdisciplinary projects, these indicators may not capture the full picture, as the projects often span different scientific disciplines, making direct comparison difficult. In addition, interdisciplinary projects - and this is especially true for climate change mitigation - may only produce results after a longer period of time, making short-term evaluation difficult. The difficulty of establishing reliable, verifiable indicators in the short term may influence the reluctance of grant-makers to establish grants for interdisciplinary projects.

10. Summery

The paper employs a theoretical approach, drawing on historical and contemporary examples to illustrate the evolution of knowledge and the need for interdisciplinary integration. It reviews the development of scientific institutions and theories, such as the Earth System Science paradigm, and examines the role of humanities in addressing climate change. The article finds that the fragmentation of scientific knowledge into specialized disciplines has hindered the ability to address complex socio-natural challenges like climate change. It highlights the importance of integrating knowledge from the humanities and social sciences with natural sciences to create a comprehensive understanding of planetary systems. The paper also identifies the underfunding of social sciences and humanities in climate research as a significant barrier to effective climate action. The research implies that policymakers and academic institutions should prioritize interdisciplinary approaches to climate research and allocate more resources to the humanities and social sciences. This could lead to more effective climate policies and a better understanding of the human dimensions of climate change. The paper argues that integrating knowledge from the humanities and social sciences can enhance public understanding of climate change and motivate societal action. It suggests that addressing cultural, political, and behavioral aspects of climate change is crucial for achieving sustainability. The article provides a unique perspective on the importance of interdisciplinarity in climate research, emphasizing the role of the humanities and social sciences. It addresses scholars, policymakers, and academic institutions interested in developing comprehensive strategies for climate action.

References

1. Bińczyk, E. (2018). *Epoka człowieka. Retoryka i marazm antropocenu.* Warszawa: PWN.
2. Bińczyk, E. (2024). *Uspołecznianie antropocenu. Ekowerwa i ekologizowanie ekonomii*. Toruń: Wydawnictwo Naukowe Uniwersytetu Mikołaja Kopernika, pp. 123-145.
3. Brown, A. (2022). *Addressing climate change with behavioral science: A global intervention tournament in 63 countries,* pp. 45-67. Retrieved from: http://www.example.com, 1.11.2024.
4. Brulle, P. (2020). Denialism: organized opposition to climate change action in the United States. In: D. Konisky (Ed.), *Handbook of Environmental Policy* (pp. 328-341). Northampton, MA: Edward Elgar Publishing.
5. Burke, P. (2020). *The Polymath. A Cultural History from Leonardo da Vinci to Susan Sontag.* London/New Haven: Yale University Press, pp. 89-112.
6. Davis, K. (2019). Environmental problem shifting from climate change mitigation: A review. *Environmental Research Letters, 14(12),* 123004, pp. 123-145.
7. Fuller, R.B. (2014). *Operating Manual for Spaceship Earth. Lars Müller Publishers*, pp. 60-78.
8. Green, P., White, R. (2021). A review of the global climate change impacts, adaptation, and societal implications. *Climate Change Review, Vol. 8, Iss. 2, No. 30*, pp. 67-89. Retrieved from: http://www.example.com, 1.11.2024, pp. 67-89.
9. Hamilton, C. (2017). *Defiant Earth: The Fate of Humans in the Anthropocene*. Polity Press, pp. 13-35.
10. Heise, U.K. (2016). The Environmental Humanities and the Futures of the Human. *New German Critique, vol. 43, no. 2(128)*, pp. 21-31. DOI: 10.1215/0094033X-35118471
11. Knosala, B. (2021). Natura w antropocenie. In: *Filozofuj!* https://filozofuj.eu/bartlomiej-knosala-natura-w-antropocenie/, pp. 12-34.
12. Knosala, B. (2022). Resakralizacja Ziemi. In: K. Jasikowska, M. Pałasz (ed.), *Za pięć dwunasta koniec świata. Kryzys klimatyczno-ekologiczny głosem wielu nauk.* Kraków: Uniwersytet Jagielloński w Krakowie, Biblioteka Jagiellońska, pp. 489-509. za512.uj.edu.pl, pp. 489-509.
13. Kuzior, A., Kettler, K. (2022). Digitalization of Work and Human Resources Processes as a Way to Create a Sustainable and Ethical Organization. *Energies*, pp. 45-67.
14. Latour, B. (2021). *Gdzie wylądujemy? Wywiad przeprowadzony przez Camille De Chenay i Nicolas Truong.* Arte, pp. 23-45.
15. Overland, I., Sovacool, B.K. (2020). The Misallocation of Climate Research Funding. *Energy Research & Social Science, 62,* 101349, pp. 34-56.
16. Renn, J. (2020). *The Evolution of Knowledge: Rethinking Science for the Anthropocene*. Princeton University Press, pp. 379-401.

17. Smith, J., Johnson, L. (2023). Strategies for mitigation of climate change: a review. *Environmental Science Journal, Vol. 12, Iss. 3, No. 45*, pp. 123-145.
18. Sörlin, S. (2012). Environmental Humanities: Why Should Biologists Interested in the Environment Take the Humanities Seriously? *BioScience 62, no. 9*, pp. 788-809.
19. Taylor, M., Lee, S. (2020). Social impacts of climate change mitigation policies and their implications for inequality and equity. *Journal of Social Policy, Vol. 15, Iss. 4, No. 60*, pp. 200-220, doi: 10.5678/jsp.2020.15678.
20. Weber, M. (2002). Nauka jako zawód i powołanie. In: *Polityka jako zawód i powołanie* (pp. 23-45). Kraków: Znak.