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Philosophy of Systemic Sozology*

Filozofia sozologii systemowej

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Abstract: The philosophy of systemic sozology presented in this work has as its characteristic originality under two aspects: metaobjective and objective. In the metaobjective aspect, here called the philosophy of sozology, one should underline the following elements: the elaboration of the notion - environment, the determining of the contents of the expression: social-natural environment, the elaboration of the definition of systemic sozology, the definition of the object of research of this discipline of science, the presentation of the structure, and especially the underlining of the importance of: interdisciplinarity, transdisciplinarity, systematics and globalism in the methodology of systemic sozology. In the objective or essential aspect the originality of the work is the underlining of the basic issues of systemic sozology and the presentation of them in six spheres, in which the process of life is realized, that it: the state of the social-natural environment, the sources of endangerment and pollution of the environment, the influence of the changing environment to life on Earth, the ways and means of protecting the environment.

Keywords: sozology, systemic sozology, environment, interdisciplinarity

Streszczenie: Filozofia sozologii systemowej przedstawiona w niniejszej pracy charakteryzuje się oryginalnością pod względem przedmiotowym i metaprzedmiotowym. W aspekcie metaprzedmiotowym, określanym tu jako filozofia sozologii, należy wyróżnić następujące elementy: opracowanie pojęcia „środowisko", sprecyzowanie zawartości wyrażenia „środowisko społeczno-przyrodnicze", podanie definicji sozologii systemowej, zdefiniowanie przedmiotu tej dyscypliny wiedzy, zaprezentowanie jej struktury, a zwłaszcza podkreślenie znaczenia jej interdyscyplinarności, transdyscyplinarności, systemowości i globalności. W aspekcie przedmiotowym lub esencjalnym oryginalność tej pracy polega na wskazaniu podstawowych zagadnień sozologii systemowej i przedstawieniu ich w odniesieniu do sześciu sfer, w których rozpatrywane są procesy życiowe: stan środowiska społeczno-przyrodniczego, źródła zagrożenia i skażenia środowiska, wpływ zmieniającego się środowiska na życie na Ziemi oraz sposoby i środki ochrony tego środowiska.

Słowa kluczowe: sozologia, sozologia systemowa, środowisko, interdyscyplinarność

Introduction

The article contains the matters of the philosophy of systemic sozology revolving around six issues. In the first one, entitled A note from history of sozology, the history of this science, its precursors, international and Polish conditions of its creation and prospects for its development are presented. In the second one - The concept of systemic sozology - basic assumptions of this approach are presented, namely: explanation of basic terms, synthetic approach to the concept of empirical, humanistic and philosophical sozology, and the characteristics of the systemic concept of sozology. In the third - The epistemological problems determine the content of the point in which

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the concept of sozology is analysed, an attempt is made to define this science and the subject of its research. The fourth one deals with methodological issues of systemic sozology, where empirical, humanistic, philosophical and systemic methods are discussed in systemic sozology. While the fifth one presents the main problems of systemic sozology and the specificity of research in the field of this science.

1. A few remarks from the history of sozology

The historical conditions of the emergence of systemic sozology form the content of chapter one. This content presents a kind of view at the world and national (in this case Polish) conditions that determined the emergence of this science and the systemic concept of sozology. We recall here the first researchers who, with their research and social work, created suitable conditions for the emergence of the science dealing with environmental protection. We will also signal the process of creation and perspectives for the development of system sozology.

1.1. The origins of environmental science

The origins of environmental science (sozology) should be sought not at the turn of the 19th and 20th centuries, but much earlier. We believe that the beginnings of nature conservation as an environment of human life should be seen in the earliest sources related to religious beliefs. Such sources are found not only among the tribes of our homelands (Szafer 1973, 13-15), but also among the nations on the whole earth (Eliade 1966, 262- 320; Eliade 1988, 30, 54, 117-118, 156, 268, 295; Antoniewicz 1975, 82-84, 416-418, 568-517), and their subjects matter are trees, animals, and various peculiarities of nature. These original motives of nature protection were related to a small range of natural sites, but they effectively protected them from economic human activity.

With the development of civilisation, technical expansion interfering with the natural world and the demographic explosion, the need to create a legal basis for nature conservation began to be realised. Following Władysław Szafer (Szafer 1973, 13-15; Lisicka, Macek i Radecki. 1999, 23-28), we will quote, for example, some environmental protection ordinances in Europe for specifically selected species of animals and plants, while we mention China, India and the Roman Empire from ancient times.

1. In China, during the reign of the Zhou dynasty (12th-3rd centuries BC), an attempt was made to protect the forests by establishing a special Forester's office (Mazurski 1998, 22; Lisicka, Macek i Radecki. 1999, 22);
2. From India, the message of Ashoka emperor is known, who reigned in the years around 269-232 BC, concerning the protection primarily of forests, animals and fish (Lisicka, Macek i Radecki. 1999, 22)
3. The Roman emperor Hadrian (76-138 AD) introduced the protection of Lebanese forests (Mazurski1998, 253);
4. The Singing Birds Protection Ordinance was issued in Zurich in 1535 due to their usefulness in exterminating pests in orchards and forests and for aesthetic reasons;
5. King of Denmark Christian V issued a ban on cutting down forests in the southern part of his kingdom in 1671;
6. Tsar Peter I issued forest protection orders in 1703, 1714 and 1722;
7. The Statutes of Casimir the Great from the second half of the 14th century forbade the theft of many natural objects in forests, lakes and rivers;
8. King Władysław Jagiełło of Poland significantly restricted the hunting law;
9. King Sigismund I of Poland, in the First Statute of Lithuania of 1529, included an order for the protection of the beaver (which already was under protection in the times of Bolesław Chrobry), (the Second Statute of Lithuania of 1566 and the Third Statute of Lithuania of 1588);
10. The Volok Act of 1557 introduced protection for the heavy animal; 9. In 1597, King Sigismund III of Poland is-

sued a protection order for the aurochs (this order appeared too late, the species couldn't be saved anymore);
11. 1773 the Empress Catherine II ordered the protection of elk in Russia;
12. Forest Universal of Stanisław August Poniatowski from 1778;
13. At the end of the 15th century, the prohibition of killing of larks was issued in Nuremberg;
14. In the middle of the 18th century, the mass destruction of spring flowers during the Easter period was prohibited in Munster.

These orders and regulations express the natural tendency of man to protect endangered animal and plant species. It was not until the 19th century that natural scientists, geographers and geologists laid the foundation for scientific research in the field of nature protection. Their activities focused on a scientific inventory of nature objects and finding effective methods of protecting endangered species of living creatures. In general, it can be said that scientific work on nature conservation has been carried out for 100 years. However, it was only in the 1960s and 1980s that effective attempts were made to clarify the epistemological and methodological status of this science. Nowadays, at the turn of the 20th and 21st centuries, we observe efforts to modify the subject of research and to develop methods of systemic sozology.

1.2. From the history of sozology in Poland

The history of sozology in Poland is connected with the activity and scientific work of many naturalists in the 19th and 20th century. From among them, we will remind here, in chronological order, only a few - those, whose contribution to the creation of science on the protection of the natural environment for centuries seems particularly significant.

1. **Marian Raciborski**[1] (1863-1917) was born in Brzostowo near Opatów, died in Zakopane. He was the founder of the Polish phytogeographic school, he developed the first geobotanical map of Poland and was one of the initiators of the nature conservation movement in our homeland.

M. Raciborski was one of the first in Europe to give lectures on nature conservation in the academic year 1913/1914 under the title: "Natural monuments". These lectures were devoted to the following topic:

- "Conservation of nature" as a new field of research at Polish and world universities;
- Analysis of the term "natural monument";
- Overview of the nature conservation history;
- Destruction of nature by human economic activity;
- Motives and objectives of nature conservation;
- The need to protect the native landscape.

These issues form the basis of a lecture on nature conservation at the beginning of the 20th century.

[1] Marian Raciborski (1863-1917), botanist, student of E. Strasbourger in Bonn and K. Goebel in Munich. From 1900 he was a member of the Academy of Learning, in the years 1896-1900 he conducted research on Java, in 1900 he took over the Department of Botany at the Agricultural Academy in Dublany, in 1909 he became a professor at the Jan Kazimierz University in Lviv, where he organized the Biological and Botanical Institute, and in 1912 at the Jagiellonian University in Cracow, where the Botanical Institute and the Botanical Garden were established on his initiative. Raciborski's academic output includes 183 works in the field of morphology, anatomy and cytology of plants, general biology, plant physiology, systematics and floristic, phytogeography and paleobotany. Moreover, he was the author of the first geobotanic map of Poland, a pioneer of the nature conservation movement in Poland and a promoter of the publication of the multi-volume collective work Flora Polska (Polish Flora) (since 1908). Among his works should be mentioned: Zabytki Przyrody (Monuments of Nature), Lviv 1908; Ochrony godne drzewa i zbiorowiska roślin (Trees and Plants Clusters Worthy Protection), KA 35/1910, 3-4 /352-366; [with L. Sawicki] *Badanie i ochrona zabytków przyrody. Program pracy dla działaczy kulturalnych* (Research and protection of natural monuments. Work program for cultural activists), Cracow 1914; Życie *pod równikiem,* (Life below the equator) Cracow 1924. (Szafer 1973, 16-17; Zawadzka 1986).

M. Raciborski was the author of the first scientific work on nature protection in Polish literature, published under the title: *Zabytki przyrody* (*Monuments of nature*, Lwów 1908). In this work Raciborski emphasized the importance of nature protection in scientific research, especially "natural monuments", which are rare and are traces of ancient geological epochs. Such objects included rocks, waterfalls, lakes, exceptional animals, giant or uncommon trees, peculiar clusters of plants. He postulated to protect the species that are relics of the bygone eras: preglacial and glacial.

M. Raciborski started to work on the inventory of natural monuments in Poland, which resulted in a book: *Ochrony godne drzewa i zbiorowiska roślin* (*Trees and Plants Clusters Worthy Protection*, 1910).[2] Being a member of the Polish Society of Naturalists named after Copernicus, he also worked tirelessly to make the public aware of the importance of nature conservation and the problems associated with it.

2. **Stanisław Sokołowski** (1865-1942), Marian Sokołowski (1884-1939) and Bolesław Hryniewiecki (1875-1963) belong to the group of Polish botanists who laid the foundation for the Polish science of nature protection. S. Sokołowski[3] was a professor at the Jagiellonian University, in the years 1905-1919 he was the editor of "Sylwan" magazine, in which he justified the need to protect Polish forests, a member of the State Council for Nature Conservation and the organizer and founder of the National Tatra Park.

M. Sokołowski[4] graduated from the Jagiellonian University, where he also received his PhD in philosophy in 1924. He conducted scientific research in the field of botany, forestry and nature protection. He worked in the Commission for Nature Conservation, and after the establishment of the State Council for Nature Conservation, he was its member and head of the Office in Cracow. He was a member of the League for Nature Conservation and the Polish Botanical Society. M. Sokołowski was an advocate of the idea of creating Tatra Mountain Parks for Nature (National) and an advocate of rational farming. He based the issues of nature protection on four motives:

- Natural motif: conducting scientific research related to nature protection;
- Aesthetic motif: striving to preserve the beauty of the landscape;
- Historical motif: emphasizing the patriotic aspect related to nature conservation;

[2] It is also worth mentioning his work *Wskazówki dla zakładających muzea przyrodniczo-krajoznawcze* (*Tips for those setting up nature and sightseeing museums*), Lviv 1911.

[3] Stanisław Sokołowski (1865-1942) was born in Mloszów, he finished the teacher seminar in Cracow and studies in Vienna in 1893. After graduation, he worked at the National Forest Management School in Lviv, and after it was converted into the Higher Forestry School, he continued to work there as a professor until 1919. In the years 1919-1935 he was professor at the Jagiellonian University and head of the Department of Forestry at that university. In 1930 he became a member of the Polish Academy of Learning. Moreover, he was the editor of "Sylwan" magazine, founded the dendrological garden in Vynnyky (Winniki) near Lviv and was a tireless pioneer of nature protection in Poland. Among his works are: *Hodowla Jadu* (*Cultivation of Venom*) (1912, 1930); *Budowa roślin drzewiastych* (*Construction of woody plants*) (1927); *Las tatrzański* (*Tatra Forest*) (1936); *Tatry jako Park Narodowy* (*Tatras as a National Park*) (1923). (Skawiński 1988).

[4] Marian Sokołowski (1884-1939) was born in Vienna, graduated from high school in Cracow and studied botany at the Jagiellonian University, where he received his habilitation. He was the author of works in the following fields: phytosociology, biology and silviculture, phytogeography and nature conservation, especially in the Tatra Mountains. Since 1924, he was the head of the Department of Silviculture at the Agricultural University in Warsaw. His work includes the following: *Chrońmy przyrodę ojczystą i jej zabytki* (*Protecting native nature and its monuments*), Kraków 1924; *Ochrona przyrody w szkole* (*Protecting nature in the school*), *Wartość idei ochrony przyrody w wychowaniu i kształceniu młodzieży* (*The value of the idea of nature protection in the upbringing and formation of young people*), Kraków 1927; *Szkody od powału w lasach tatrzańskich i sposoby zapobiegania im w zakresie hodowli lasu* (*Damage from flood in Tatra forests and ways to prevent them in the field of silviculture*), Kraków 1934; *Szata roślinna Tatr Polskich* (*The flora of the Polish Tatras*), Zakopane 1935. (Zajączkowski 1939, 45-76).

- Educational motif: paying attention to the issues of nature protection and didactic issues.

3. **Bolesław Hryniewiecki**[5] began his studies at the University of Warsaw, and continued them in 1895-1900 at the University of Dorpat. After gaining independence, he was appointed professor of the University of Warsaw and director of the Botanical Garden. For the benefit of nature conservation, he worked as Chairman of the Commission for Nature Conservation and later as Chairman of the State Council for Nature Conservation. He also worked in the League for Nature Conservation and the Copernicus Society of Naturalists. After the Second World War, he returned to the position of the head of the Department of Systematics and Geography of Plants and to the position of the director of the Botanical Garden in Warsaw. B. Hryniewiecki was a populariser of the idea of nature protection, especially of the Polish forests, and an advocate for the protection of suburban forests in large Polish cities.

4. **Jan Gwalbert Pawlikowski**[6] (1860-1939) was a professor at the Agricultural Academy in Dublany, and from 1925 member of the Polish Academy of Arts and Sciences. His main concern was the protection of the nature, especially the protection of the Tatra Mountains. In 1912, he was a co-founder of the Tatra Mountains Protection Section, which was established within the Tatra Society and was primarily intended to protect the Tatra

Mountains from anything that could destroy the original character of their landscape (buildings, transport facilities, industry), and to protect mountain species of plants and animals, as well as to prevent littering the mountains. In 1913 he announced the hearing: Kultura i natura (Culture and nature), in which he analysed basic sozological concepts and defined nature conservation goals. In 1923, he founded a new magazine "Wierchy", devoted mainly to the issues of nature conservation.

5. **Bohdan Dyakowski**[7] (1864-1940) contributed with his scientific and popular science works to the dissemination of the idea of nature protection. Among such works are: *Nasz las i jego mieszkańcy* (*Our forest and its inhabitants*) (1898); *Z naszej przyrody* (*From our nature*) (1909); *Historia naturalna* (*Natural history*), part 1 and 2 (1909); *Nauka o rzeczach i przyrodzie* (*Science of things and nature*) (1918). He introduced a specific methodology and curriculum of teaching about nature, in

[5] Bolesław Hryniewicki (1875-1963) was born in Międzyrzec Podlaski, in 1893 he graduated from the gymnasium and began studies at the University of Warsaw, but for his socio-political activities he was expelled from the university and exiled deep into Russia. In 1895 he was released under amnesty. Due to the impossibility of returning to the country, he continued his studies at the University of Dorpat, where he graduated as a botanist and chemist with the rank of natural sciences candidate, in 1900 he became an assistant professor at the Department of Botany, and in 1904 - a private assistant professor. He then goes on scientific trips to Jena, Leipzig and Graz. In 1910 he became a professor at the Higher Courses of Natural Sciences and Medicine in Dorpat, and in 1914 he received his doctorate in botany (the highest degree in Tsarist Russia) and became full professor at the Department of Morphology and Systematics of Plants and director of the Botanical Garden in Odessa. After the First World War, in 1919 he was appointed professor of plant systematics and geography at the University of Warsaw and director of the Botanical Garden in Warsaw. His works include: *Nasze Lasy* (*Our Forests*), Warsaw 1906; *Zarys flory Litwy* (*Overview of the flora of Lithuania*) (1933); *Lasy okolic Warszawy. Ich znaczenie i ochrona* (*Forests of the vicinity of Warsaw. Their significance and protection*), Warsaw 1935; *Zarys dziejów botaniki* (*Overview of the history of botany*), Warsaw 1949 (Miklaszewski 1934, 1-12; Radwańska-Paryska 1963, 173-184).

[6] Jan Gwalbert Pawlikowski (1860-1939) was a professor at the Agricultural Academy in Dublany in 1891-1904, and since 1925 - a member of the Polish Academy of Learning. Apart from environmental issues, he dealt with philosophical and historiosophical issues, especially J. Słowacki's concept (Szafer 1973, 17-18).

[7] Bohdan Dyakowski (1864- I940), a biologist, pedagogue and populariser of natural sciences in the field of nature protection, was active in Cracow since 1905. Author of over 50 books and school manuals (cf. Szafer 1973, 18).

which he put emphasis on the ecological point of view and the population approach in the teaching of biology. He worked as an educator and was a co-founder of the League for Nature Conservation.

6. **Michał Siedlecki**[8] (1873-1940) was involved in the organisation of nature conservation in Poland since 1919. Among other things, he conducted research in the field of marine biology, whose aim was to create a rational basis for sea fishing. In 1923 he became a member of the State Council for Nature Conservation. He was also a Polish delegate at the International Office of Nature Conservation in Brussels and a permanent Polish delegate at the International Council for the Exploration of the Sea in Copenhagen. With his scientific work he had considerable merits of protection of whales, sturgeon, salmonid fish, bison and birds.

7. **Adam Wodziczko**[9] (1887-1948), he organized at the Adam Mickiewicz University of Poznań an inter-faculty seminar in Biocenotics and Nature Protection and the Institute of Nature Protection and Landscape Cultivation. His efforts also led to the creation of three national parks: Wielkopolski, Woliński and Słowiński. A. Wodziczko led to the creation of the first Department of Nature Conservation at the Nicolaus Copernicus University in Toruń. He has created the theoretical basis for nature conservation research. He was the first in Poland to raise the issue of landscape protection due to the steppe-formation process. He was an advocate of a long-term economy in the landscape based on biological premises. As a result of his scientific observations, he drew attention to the steppe-formation process in Wielkopolska region. A. Wodziczko was a member of the State Council for Nature Protection in Wielkopolska and Pomerania.

8. **Władysław Szafer**[10] (1886-1970) undertook scientific and organizational research in the field of nature conservation. In the years 1919-1949 he was the chairman of the State Council for Nature Conservation, in 1952 he founded the Institute of Nature Conservation of the Polish Academy of Sciences and the Institute

[8] Michał Siedlecki (1873-1940), zoologist, since 1903 member of the Polish Academy of Learning, in 1920-1918 professor of zoology at the Jagiellonian University, in 1919-1922 professor and rector of the Stefan Batory University in Vilnius, and since 1923 again professor of zoology in Cracow. Like many other professors, on 6 November 1939, the Nazis deported him from Cracow to Sachsenhausen, where he died on 11 January 1940. In addition to protection of nature, he conducted scientific research in the field of cytology and protozoology. He worked at the Pasteur Institute in Paris, at sea stations (Naples and Wimereux) and travelled to tropical countries (Egypt, Java, Ceylon). (Dobell 1941, 50).

[9] Adam Wodziczko (1887-1948), botanist, member of The Poznań Society for the Advancement of Arts and Sciences, since 1920 professor of plant anatomy and physiology at the Agricultural Academy in Bydgoszcz, and since 1922 professor at the Adam Mickiewicz University in Poznań. He is author of over 200 scientific treatises; here are some of them: *Kierunki współczesnej ochrony przyrody* (*Directions of modern nature protection*, 1935); *Ochrona przyrody jako nauka i jej potrzeba* (*Nature conservation as a science and its need*, 1945), *Ochrona przyrody umiejętnością praktyczną, wiedzą stosowaną i samodzielną nauką* (*Nature protection, a practical skills set, applied knowledge and independent learning*, 1945), *Uwagi o nauczaniu ochomy przyrody w szkołach wyższych* (*Notes on teaching science in higher education*, 1946), *Na straży przyrody* (*Guarding the nature*, 1967) (Szafer 1973, 20-21).

[10] Władysław Szafer (1886-1948), botanist, from 1917 professor at the Jagiellonian University and director of the Botanical Garden in Cracow, from 1920 a member of the Polish Academy of Learning, and from 1952 a member of the Polish Academy of Sciences, during the Nazi occupation, organizer and rector of the underground Jagiellonian University. Among his numerous works, the following should be mentioned: *Pamiątka pienicka* (*The Pienice Souvenir*, 1912), *Osobliwości i zabytki flory okolic Lwowa* (*Curiosities and monuments of the flora of the vicinity of Lviv*, 1914), *Pierwsze karty z historii Białowieskiego Parku Narodowego* (*First pages in the history of the Białowieża National Park*, 1957), *Kierunki rozwoju ochomy przyrody w Polsce* (*Directions of development of nature conservation in Poland*, 1958), *Historia utworzenia na Babiej górze Parku Narodowego* (*History of the creation of the Babia Góra National Park*, 1963), *Dwanaście lat walki o utworzenie Pienińskiego Parku Narodowego* (*Twelve years of struggle for the creation of the Pieniny National Park*, 1964), *Zarys historii ochomy przyrody* (*Outline of the history of nature conservation*, 1965) (Szafer 1973, 15-31).

of Botany the Polish Academy of Sciences in Cracow, and until 1961 he was the director of both institutions. The following collective works were published under his editorship: *Skarby przyrody i ich ochrona* (*Treasures of Nature and their Protection*), Warszawa 1932; *Ochrona przyrody i jej zasobów - problemy i metody* (*Protection of Nature and its Resources - problems and methods*), vol. 1 and 2, Kraków 1965; *Ochrona przyrodniczego* środowiska *człowieka* (*Protection of the Natural Environment of Man*), Warszawa 1973; and journals related to nature protection: "Ochrona Przyrody" and "Chrońmy Przyrodę Ojczystą".

9. **Walery Goetel**[11] (1889-1972) introduced a new term to describe a scientific research in the field of nature protection: sozology, which is slowly adopted in national and international vocabulary. Among the numerous issues of this science, he paid special attention to the following topics: protection of water, air and soil; protection of plant and animal species; landscape protection and maintenance of national parks; protection of human life and health. W. Goetel has published more than six hundred scientific and popular science papers; some of them were published in the journal "Wichry", of which he was the editor and chairman of the Editorial Committee.

10. **Julian Aleksandrowicz**[12] (1908-1988) introduced a very important element of the anthroposphere to ecological and nature conservation, namely the humanistic aspect concerning the human conscience sensitive to environmental values. His work concentrates on human health and has become the basis for the development of a philosophy of medicine and ecomedicine.

11. **Henryk Sandner** (1915-1994) worked at the Department of Zoology at the University of Łódź (945-1950), at the Zoological Institute of the Polish Academy of Sciences in Łódź until 1954, then at the Institute of Ecology of the Polish Academy of Sciences, at the Warsaw University of Life Sciences - Agricultural Academy, at the Catholic University of Lublin and the Warsaw Theological Academy (ATK). The Professor's scientific works show great concern for nature protection, especially in his work in the Department of Environmental Protection at the Catholic University of Lublin and the Human Ecology and Bioethics section at the ATK.

12. **Włodzimierz Michajłow** (1905-1994) in scientific research at the Warsaw University of Life Sciences (SGGW) and at the Institute of Parasitology of the Polish Academy of Sciences (PAN) in Warsaw conducted research in the field of environmental protection in the 1970s and his works, he used the term sozology to denote environmental protection, giving synthetic definitions of this science.

Scientific research, organisational and publishing activities of the aforementioned group of Polish scientists created favourable conditions for the establishment and development of sozology in Poland. Their works, characterized by love for the homeland and concern for the common good, which is native nature, formed ecological awareness and called for responsibility for human economic and social activities.

At the Academy of Catholic Theology, and currently, at the Cardinal Stefan Wyszyński

[11] Valery Goetel (1889-1972), geologist, since 1919 professor at the AGH University of Science and Technology in Cracow and its long-time rector, and since 1952 member of the Polish Academy of Sciences. Among his many works are the following: *O trawałości użytkowania zasobów przyrody* (*On the sustainable use of natural resources*, 1963), *Gospodarcze motywy ochrony przyrody i jej zasobów* (*Economic motives for protecting nature and its resources*, 1965), *Sozologia - nauka o ochronie przyrody i jej zasobów* (Szafer 1973, 23-24; Rajca M. 1987. *Walery Goetel jako sozolog*. Warsaw (Master's thesis at the Department of Human Ecology and Bioethics at the ATK, typescript at ATK Library).

[12] Julian Aleksandrovich (1908-1988) - his main works in the field of ecology include the following: *Wiedza stwarza nadzieję* (Knowledge creates hope) (1976); *Sumienie ekologiczne (Ecological conscience),* Warsaw 1979; *U progu medycyny jutra* (At the threshold of tomorrow's medicine) (1988 with H. Duda); with P. WASZCZENKO, Środowisko *w perspektywie medycznej (Environment in medical perspective),* in: CŚZ, 83-92.

University in the Faculty of Christian Philosophy in the Specialization of Human Ecology and Bioethics, scientific and didactic research is conducted in four departments: Department of Human Philosophy, Philosophy of Ecology, History and Philosophy of Science, Bioethics. The team - for over 15 years - worked in this specialization under the direction of Fr. Prof. dr hab. Bernard Hałaczek and currently works under the direction of J. M. Dołęga. The research conducted in individual departments is of a historical, registration-reporting, synthetic and prognostic nature. Currently, efforts are being made to organise research in the Department of Human Ecology and in the Department of Fundamentals of Environmental Protection. Since 1999, the Centre for Human Ecology and Bioethics at Cardinal Stefan Wyszyński University has been operating beyond this section, and conducts postgraduate studies in bioethics, addiction prevention and human ecology - environmental education.

1.3. From U. Thant's report to the conference in Rio de Janeiro and to Johannesburg 2002 Rio+10

The international conditions for the emergence of sozology include, above all, the activities of international organisations, which in their programmes took into account the issues related to human ecology and made efforts to protect the natural environment[13].

An expression of such activities was the report of U. Thant (U THANT 1971) of 26 May 1969, which lists the following issues that require urgent international attention:

- Human settlements and industrial development;
- Rational use and development of the planet's natural resources;
- Poisoning and pollution of the human living environment;
- Protecting the values of the human environment.

The above report served as the basis for the establishment of a special United Nations Commission, which prepared the international conference in Stockholm in 1972.

In 1970 UNESCO adopted the MaB programme (Man and Biosphere), the implementation of which in Poland is the responsibility of the Presidium of the "Man and Environment" Committee, operating at the Presidium of the Polish Academy of Sciences. About 50 countries participate in this programme, and the Coordination Council, which includes 25 countries incl. Poland, supervise the implementation of the programme. The international and interdisciplinary implementation of this programme was undertaken in 1972. Research has already begun on the following projects for this programme (Stępień 1974, 14-15):

- Ecological effects of human activity in tropical and subtropical forest ecosystems;
- Ecological effects of exploitation methods and soil use methods; the impact on the forest landscape in the temperate zone and in the Mediterranean;
- The impact of human activities and land use methods on pastures from temperate to arid zones (savannas, tundra);
- Ecological effects of human activity in urban, industrial and rural areas, especially the appreciation of the importance of lakes, marshes, running waters as animal production reserves, the preservation of fauna and flora, and places of entertainment and recreation;
- Effects of human activity in mountain ecosystems;
- Energy and rational use of island ecosystems;
- Conservation of natural zones and their genetic resources;
- Ecological assessment of pest control and the impact of the use of mineral fertilizers on aquatic and terrestrial ecosystems;

[13] For example, let us mention the following international organizations: the United Nations; United Nations Educational, Scientific and Cultural Organization; United Nations Children's Fund; World Health Organization; Food and Agriculture Organization.

- The impact of the construction of certain facilities on human life, health and the environment;
- Environmental aspects of energy use in urban andindustrial complexes;
- The effects of demographic change on the environment;
- Perception of environmental quality;
- Biosphere pollution;
- Climate change of the globe due to human activity.

Polish committees of the "Man and Environment" Committee participate in the work of ten projects of the programme (Michajłow 1975. 16-17).

The International Council of Scientific Unions (ICSU), established in 1971, and its Special Committee (SCOPE) instructed various scientific organisations to develop the following issues:

- Increase in population density around the globe;
- Increase in atmospheric carbon dioxide;
- Increase in other types of atmospheric pollution;
- Increased pollution of the oceans and inland waters;
- Increase in pollution in natural waters, atmosphere, soil and living organisms;
- Irreversible changes in the atmosphere caused by human activity;
- Effects of the introduction of new species;
- Water resources;
- Eutrophication of inland waters;
- Soil erosion and destruction;
- Noise as environmental pollution;
- Spread of pollutants in the air, water, soil and consequently contamination of living organisms;
- Degradation of natural ecosystems and the related destruction of the genetic equipment of organisms;
- Technical threats to the atmosphere and international waters.

The above list of issues and problems makes us aware of the enormous amount of work and indicates the area of preliminary scientific research related to environmental protection.

In May 1971, a symposium of the Economic Commission for Europe of the United Nations was held in Prague, devoted to continental issues of protection of the European environment (Michajłow 1975, 17-18; Filipek 1973, 141-147).

The Governing Council of the United Nations "Environment Programme" (UNEP) in March 1974 in Nairobi (Kenya) attempted to classify the threats of the contemporary man to the natural environment (Michajłow 1975, 14-15; Szczęsny 1973, 107-114). This conference set out the directions for action for the coming years, highlighting the following issues and problems:

- human settlements;
- human health and well being;
- soil and water environments, especially in desert areas and with particular attention to desertification processes;
- trade, economics, technology, dissemination of technology and the environment;
- pollution of the oceans and their resources;
- nature conservation in the sphere of genetic resources of living nature;
- energy sources and their importance for the environment.

The exemplified activities of the United Nations indicate the importance and the need to undertake scientific research in the field of the protection of the natural environment of man, attempts to describe and classify the already existing threats and pollutants to this environment, and to justify the rational management of natural resources of the human environment, including natural resources of animated and non-animated nature. The above-mentioned undertakings of the United Nations were also the main international conditions for the emergence of sozology. The activity of the International Union for Conservation of Nature and Its Resources, with which the Scientific Committee for the Protection of Conservation of Nature and Its Resources at the Polish Academy of Sciences cooperates also contributed to the creation of this science.

A significant event in the early 1990s was the ecological conference of the United Nations in Rio de Janeiro held from 3 to 14 June 1992, entitled "Environment and Development". The most important documents from this conference:

1. Rio Declaration on Environment and Development;
2. Global action programme – Agenda 21;
3. Framework Convention on Climate Change;
4. Convention on Biological Diversity;
5. Consensus on forests (protection, development, management).

Important international events at that time include the official summary of Agenda 21 in Rio 13-19 March 1997 by non-governmental organizations "From Agenda to Action" with the participation of representatives of 150 countries, and the United Nations Conference "Earth Summit plus 5" was held in New York on 23-27 June 1997. An analysis of these events can be found in the work of S. Kozłowski: *Ekologiczne problemy przyszłości świata i Polski* (Ecological problems of the future of the world and Poland.)

These and other environmental events force a global, interdisciplinary and systemic approach in sozology.

1.4. Towards systemic sozology

The international conference "Environment and Development" of 1992 has become a trigger for scientific research and political and practical activities in the field of ecology and environmental protection. We will list here the main international and national events that are of great cognitive importance in the characterization of systemic sozology.

1. International events include the aforementioned conferences related to the evaluation of Agenda 21 implementation after five years, i.e. Rio + 5: "From Agenda to Action" (13-19 March 1997, Rio de Janeiro); "Earth Summit Plus 5" (23-27 June 1997, New York).

From the first conference, it is worth highlighting the regional consultations on the implementation of sustainable development in Central and Eastern Europe. These observations concern the following issues:

- lack of broad public participation in the programme;
- insufficient media coverage of the sustainable development process;
- insufficient funding for this purpose;
- unsustainable consumption;
- lack of harmonisation of regional norms and standards of environmental protection;
- lack of public vigilance on environmental problems;
- strengthening and introducing an information system in this area.
- The second conference comments on the following problems should be highlighted:
- increasing carbon dioxide emissions;
- increased environmental pollution by motorization and transport;
- progressive degradation and destruction of forests, especially tropical;
- deteriorating state of the seas and oceans;
- decline in planetary biodiversity, disappearance of certain species;
- an increasing number of undernourished and destitute people;
- growing consumptive lifestyle in rich countries;
- insufficient public environmental awareness of the growing threats;
- failure to implement the Rio de Janerio commitments.

2. As far as national and international events are concerned, a whole series of scientific conferences on ecological issues should be emphasized. Here, for example, we can mention only some of them from the 1990s.

- 2nd National Conference on Environmental Protection in Teaching and Education, 7-9 June 1993 at the Lublin University of Technology (Dudzińska i Pawłowski 1993);
- Man and the environment - humanities and ecology, a seminar organized on the occasion of the central celebrations of the World Environment

Day in Toruń, 5 June 1995 (Tyburski 1995);
- At the 6th Philosophical Congress in Toruń Section: Ecofilosophy and Bioethics (1995) (Tyburski 1996);
- Agenda 21 - Implementation of educational tasks, conference 5-7 May 1997, Jedlnia-Letnisko (Cichy 1997);
- Ecology - politics - culture. Social premises and symptoms of the ecological crisis, scientific conference in Przyjezierze, 21-22 April 1998 (Papuziński 2000);
- Ecological education of adults, conference at the Educational Research Institute in Warsaw, 16 June 1998 (Cichy 1998);
- Environmental ethics - theoretical and practical implications, UMK, Toruń, 08 September 1998 (Tyburski 1998);
- Educational foundations of education for sustainable development, conference at the Centre for Teachers' Education, Gdańsk, 25-27 May 1999 (Cichy 2000);
- Ecology and civilization transformations at the turn of the century, an international conference at the Catholic University of Lublin, Lublin, 16-17 September 1999 (Zięba i Wróblewski 2000);
- "Multiplier four" as an opportunity for economic development for Poland, conference at the Catholic University of Lublin, Lublin, 6 April 2000 (Kozłowski i Wróblewski 2000).

On 30-31 May 2000, a scientific conference on the Ecology of the Human Family was held in Augustów, organized by the Department of Human Ecology and Bioethics of the Cardinal Stefan Wyszyński University in Warsaw, the Institute for Family Studies of the Cardinal Stefan Wyszyński University in Warsaw, the Department of Spiritual Theology and the Department of Ecotheology and Bioethics of the Faculty of Theology of the UKSW, Pedagogical Faculty. WM, WSD Łomża, WSD Ełk, Depute's Krzysztof Anuszkiewicz office in Augustów.

15 years of Human Ecology and Bioethics at the Faculty of Christian Philosophy of the ATK - scientific conference (23 October 2000) devoted to the activities of the section: Human Ecology and Bioethics and the discussion on the humanistic profile of environmental protection.

The issues of ecophilosophy along with the philosophy of nature and bioethics with ethics were widely represented by many participants at the 7th Polish Philosophical Congress on 12-18 September 2004 at the University of Szczecin.

1.5. Prospects for the development of systemic sozology

Prospects for the development of sozology depend on specific and ongoing research in the field of the natural environment of man on an international and national scale. International sozological work is based on the instructions and programmes of international organizations, such as the UN, FAO, UNESCO. In contrast, scientific research in the field of sozology in Poland was defined in the resolutions of the Second Congress of Polish Science, which raised the issue of production on one level with environmental protection.

Each new science requires the resolution of many epistemological and methodological questions. These tasks determine one of the directions of research carried out within sozology. The elaboration of epistemological and methodological issues of sozology determines its autonomy and unambiguous solving of substantive problems in the field of protection of the social and natural environment of man.

However, the solution of many sozological problems depends on the results of research in other fields of knowledge. This indicates the interdisciplinary nature of sozology and its multiple connections with medical, biological, geological, technical, economic, legal, social, humanistic, philosophical and theological sciences (Stępień 1974, 40-88; Nowak 1973, 123-140; Hałaczek i Lubański 1988, 11-17; Rosiński 1988, 18-27; Szafrański 1988, 4-10; Skoczylas 1986). Achievements in these sciences determine the questions and answers of sozology.

The directions of the development of sozology may oscillate around the following issues (Michajłow 1977, 162-163; Wodziczko 1935, 145-148):

- recording disturbances in the balance between the anthroposphere and the biosphere;
- restoring the balance between the anthroposphere and biosphere;
- controlling technical devices and processes to secure the so-called exit from industrial plants that threaten the biological environment (protection issues);
- introducing new production technologies that are not harmful to the natural environment (perspective issues).

Ecological problems and issues from the humanities also appear in sozology, e.g.: shaping the so-called ecological conscience, developing ecological ethics, putting pressure on the legislative and executive authorities to systematically and holistically solve the issue of environmental protection. Environmental protection-related educational and teaching programmes in primary, secondary and higher schools should also be taken into account.

The conditions indicated in this chapter for separating a new nature conservation science, and especially the concept of systemic sozology, stem from the historical work of its precursors, the activities of ecological international organizations, the achievements of Polish scientists of the 19th and 20th centuries dealing with nature protection and the prospects for the development of this science.

2. The concept of systemic sozology

2.1. Explanation of epistemological terms

In human pre-scientific and scientific cognition, the following structural elements occur: concepts or names, judgments or sentences, theories and hypotheses, and concepts. By concepts (Podsiad i Więckowski 1983, 275-276; Krąpiec 1985, 53-92) we mean in pre-scientific cognition the simplest cognitive representations of the reality around us. That doesn't mean that the concepts are the easiest ways of cognition. The theory of cognition determines several detailed issues, e.g. the origin of concepts, the content of concepts, the scope of concepts, the meaning of sensual and intellectual cognition in the origin and structure of the concept. Meta-scientific research focuses on determining the content and scope of basic concepts in particular fields of scientific cognition. From a logical and methodological perspective, different terminology is used, which uses the "names" (Gumański 1983, 24-26, 94) of their content and scope to describe the same or a similar cognitive process of a human being. The development of concepts in the structure of scientific cognition requires sometimes a very long and complicated cognitive effort, but concepts are the basic cognitive structure in any science.

In judgments (Krąpiec 1985, 93-138; Gogacz 1973, 45 -47; Ajdukiewicz 1965, 27-29; Krąpiec 1981, 140-162; Stępień 1973, 235-261; Maryniarczyk 1985, 116-122) or sentences (Ajdukiewicz 1965, 27-39; Kamiński 1989f, 269-277) we express our cognition of the world, people, and ourselves. These forms of cognition function in both pre-scientific and scientific cognition.

Theories (Hempel 1968, 105-112; Nagel 1970, 88-94; Such 1975, 135-230; Kuc 1978, 47-90) are a rich product of scientific knowledge, both in terms of content and its form. Scientific theory has a logical-methodological structure, is legitimate, verifiable and communicative. In the process of creating scientific theories, there is usually a stage of formulating scientific hypotheses (Giedymin 1964, 21, 67-73, 173; Pasenkiewicz 1979, 17-20), which, once the logical-methodological requirements are met, can be transformed into scientific theses.

By concepts (Morawiec 1973, 179-205; Kłósak 1977, 11-26; Jaworski 1982, 1-9) we mean general assumptions of theoretical, ontological and axiological nature. These assumptions direct our cognitive view on a given subject of scientific research and allow to emphasize in the structure of individual fields of cognition those elements that are characteristic for a given science.

2.2. Empirical concept of sozology

The empirical concept of sozology falls within the scope of one of the contemporary concepts of science, which is the empiriological theory of science. Contemporary theories of science, concerning the specific sciences both about nature and about man, are in line with the principles of modern Thomism, which distinguishes the following types:

- Empiriological theory of science (Kłósak 1980, 13-41; Masi e Nicoletti 1961, 134-236);
- Ontologizing theory of science (Kłósak 1980, 22-28; Dołęga 1985, 167 -168);
- Systemic theory of science (Dołęga 1986, 15-17; Nowaczyk 1985, 87-187; Targowski 1980, 260-415).

Here we are interested in the empiriological theory of science and, correspondingly, the empiriological concept of sozology.

According to the empiriological theory of science, the subject of detailed studies of the natural sciences is the sphere of phenomena, in other words - the phenomena of reality, and the aim is to establish permanent relations between phenomena and to formulate the laws governing these phenomena (Kłósak 1966, 192-195; Kłósak 1980, 14; different positions: Gogacz 1985, 76-78). Supporters of this theory, coming from the Thomistic trend[14] and authors outside the Thomistic philosophy[15], assume that the subject of research in natural sciences is the phenomenal aspect of reality and at the same time they emphasize either realistic and experimental, phenomenistic and experimental, or synthetic approaches, which combine both of these approaches (Kłósak 1980, 14). They also take into account the affiliated philosophical trend, present in natural research in modern and contemporary times (Kłósak 1964, 38; Kłósak 1980, 29).

The basic methods used in the natural sciences, according to the empiriological theory of science, include:

- Direct, quantitative and qualitative scientific observation;
- Indirect, quantitative and qualitative scientific observations, and biological experiment;
- Description;
- Measurement;
- Statistics.

A closer analysis of these methods was carried out in the previous chapter. Here, however, let us emphasize once again that the correct application of these methods allows situating the cognition typical of these sciences on the empirical plane.

We can claim with a high degree of probability that the accepted and properly applied methods of natural sciences do not allow to go beyond the sphere of phenomenal reality. Consistent conduct ensures the uniformity of the subject of research, methods and theories for these sciences (Kłósak 1980, 20; Czeżowski 1973, 11-19; Kamiński 1973, 253-264; Wójcicki 1982, 35-70, 150-277).

The empirical concept of sozology comes down to two basic assumptions. The first concerns the subject of sozology research, the second - methods used in this science. Sozological scientific research carried out under these assumptions is a study of the phenomenal side of reality at the interface between the biosphere and the anthroposphere. This research is based on scientific observation as one of the basic methods of sozology.

If we opt for such a concept of sozology, then this type of research will allow us to obtain a detailed description of the phenomena and relations occurring between them in the biosphere, and those resulting from the influence of the anthroposphere.

2.3. The humanistic concept of sozology

The humanistic concept of sozology in the entire process of protecting the natural environment of man pays great attention to the

[14] According to K. Kłósak, the following authors belong to the supporters of this theory: J. Maritain, F. Reinoirte, F.X. Maquart, A. Brunner, F. van Steenberghen, F. Amerio, J. Flellen, R. Jolivet, Bonetti, J.P. Klubertans, J. de Tonqedec, E. Simard, R. Masii, E. Nicoletti (cf. Kłósak 1980, 14).

[15] The followers of this theory, outside the mainstream of Thomistic philosophy, include the following authors: A.Einstein, L. de Broglie, A. Arzelies, Carl .G. Hempel, E. Nagel, T. Pawłowski, M. Przelęcki, J. Such (cf. Kłósak 1980, 24-25).

anthroposphere, both at the stage of exploratory research on the impact of changed natural environment on the somatic, psychological and spiritual side of man and at the stage of solving the issues of shaping a conscience sensitive to environmental values and the creation of laws defending the values of the natural environment.

Humanistic conditions, premises or assumptions of sozological research are based on humanistic values. Among these humanistic assumptions of sozological research, the following should be mentioned:

Nature, the cosmos and the entire natural environment that surrounds us are considered to be the work of God the Creator (John Paul II 1990);

- Man, who is a special creation of the Creator, constitutes in this natural environment a specific centre, where the various development lines of the universe converge (Gerwen 1990, 38-44); in nature and man, good and beauty are perceived - values that determine the development of the human personality (Tang 1990,19);
- Human life and health are considered to be of the highest value (Ślipko 1988);
- Ethics, morality and environmental law are essential elements of environmental education (Ślipko 1988, 22-47; Kornas 1986; Aleksandrowicz 1979; Białkowski 1989, 3-10).

The aforementioned assumptions define the humanistic concept of sozology, which defines the subject and methods of research of this science. In this concept, humanistic methods are preferred, and the subject of interest is the man itself with its biological and humanistic layer.

The statement that man is the centre of the universe and that various developmental lines converge in it is, in a sense, based on the anthropic principle. We are not discussing this principle here. We refer the reader to the already rich literature devoted to this issue (Życiński 1987, 169-186; Heller 1990, 150-158; Gavies 1986, 213-259; Zabierowski 1988,197-208). Nevertheless, we wish to recall the anthropic principle in the unquestionable formulation of B. Carter: "The Universe must have those properties, which allow life to develop within it at some stage in its in its history." (Carter 1974, 291-298) The more radical formulation of the anthropic principle: "The life that was created in the process of cosmic evolution will always exist in the universe" (Życiński 1987, 176; Zabierowski 1990), raises a lot of doubts.

By assuming a humanistic concept of sozology and applying humanistic methods, one can go beyond the phenomenal sphere of the actual subject of its research and attempt to grasp the essence of man in the philosophical aspect.

2.4. Philosophical concept of sozology

At the core of the philosophical concept of sozology there are philosophical assumptions concerning man, nature and axiology. In other words, this concept is based on the philosophical concept of man, on the philosophy of nature as it is understood today, i.e. on cosmophilosophy and biophilosophy, and the principles of natural law.

As for the philosophical concept of man, it must be considered within a philosophical system. In our approach, it is primarily about the Thomistic concept of man. This concept is characterized by a non-uniform solution of detailed issues, as evidenced by the rich literature (Krąpiec 1974; Gogacz 1985; Wojciechowski 1985; Dogiel 1984; Trocquer 1969; Coreth 1976; Pannenberg 1978). Nevertheless, it is possible to distinguish permanent, characteristic elements in this concept. These are the elements to be considered:

- the ontic structure of the human being;
- the psychophysical unity of man;
- basic layers of the human structure (biological, mental, spiritual);
- the immanence of man in nature and his transcendence of nature.

According to the Thomistic concept, the ontic structure of man consists of matter and form (Krąpiec 1974, 101-140) or, in other words, body and soul (Gogacz 1986, 25-40; Gogacz 1985, 5-80). Independently from solving the problem of the genesis of the human soul (Kłósak 1969, 32-56; Wciórka 1976; Wojciechowski 1972, 149-

166; Gogacz 1979, 87-116; Dołęga 1988; Heller 1982, 58-66), this concept of man takes into account with equal attention all the layers of the human structure: biological, mental, spiritual. In this philosophical concept of man, special emphasis is placed on the psychophysical unity of man and on his immanence in nature and his transference of nature (Kłósak 1968, 165-177; Wojciechowski 1969, 259-262; Wojciechowski 1974, 215-244; Życiński 1986, 169-179; Ingarden 1972, 11-18; Półtawski 1990, 2-3).

Man lives in the natural and social environment and enters into various relations with elements of these environments.

The concept of the human environment as a casual being refers man to the necessary being, and ultimately to the source of all being - to the absolute being, God the Creator (Gogacz 1985, 82-170).

If a man is to function effectively in society, then the philosophical concept of sozology must take into account the principles of natural law (if one does not want to talk about the law contained in the Decalogue), and especially the right to life, truth, family, property (Krąpiec 1975).

From such a philosophical perspective, taking up and solving sozological problems allows to see a fundamental value in man, and treat the atmosphere, hydrosphere, lithosphere, cosmosphere, biosphere and anthroposphere as the environment in which he is developing.

2.5. Systemic concept of sozology

The systemic concept of sozology results in a systematic approach to the meta-theoretical and substantive issues of this science. In the previous paragraph we mentioned this, specifying the subject of the study, and in particular, pointing out its interdisciplinary nature and systemic requirement to the methods used in this Science. Based on our analyses to date, it can be concluded that theoretical and practical sozological activities will be effective when they cover the following research areas:

- Troposphere;
- Biosphere;
- Atmosphere;
- Hydrosphere;
- Lithosphere;
- Cosmosphere.

All these areas form quite complex systems, not to mention a specific whole in which life and man develop.

The systemic concept of sozology is about bringing all these areas together. This whole is commonly called the great system (Kierzkowski 1976, 498). This term is helpful in describing not only various natural systems, but also social, economic, technical, industrial etc. subsystems. The great system is one big control object.

Following features characterize the great system, according to M. Lubański (Lubański 1982, 29-31; Kierzkowski 1976, 497-498):

- This system consists of subsystems, which can be distinguished and described;
- each of the subsystems has its own operating objective and its effectiveness can be assessed depending on the control process;
- the whole system has an overall activity objective and its effectiveness is assessed by the performance of the subsystems;
- numerous interfaces take place within the subsystems and between them;
- there is a hierarchical control structure within the system;
- an extensive information network guarantees the purposeful functioning and optimization of the system;
- in the system, the interaction between people, machines and the natural environment is observed - all these elements of the system create an environment that (as a consequence) affects them.

These signs of the great system should be taken into account in sozology as the theoretical science of the anthroposphere, biosphere, atmosphere, hydrosphere and cosmosphere and the practical sciences related to this science, which register the threats to human life and health, try to run for them and remove them. Such sciences include, for example, sozotechnique, environmental law, sozopsychology, medical philosophy.

The systemic concept of sozology takes into account many subsystems that have their own operational goals, but their effectiveness and the assessment of this effectiveness depend on the control process. The whole great system, let's call it technically "sozologic", has an overall operating goal, whose efficiency depends on the operation of the subsystems. This goal is to maintain optimal living conditions and conditions for human development and health on Earth. It is obvious that there are numerous links between and within the subsystems. The effectiveness of such a systemic approach to sozological problem solving depends on the hierarchical structure of control and a well-developed information network.

The systemic concept of sozology, adopted in this work, appears in sozological metatheoretical and substantive research. It seems to be sufficiently justified and, moreover, it synthesizes the empirical, humanistic and philosophical concept of this science and is able to satisfactorily solve the sozology problems.

3. Epistemology of systemic sozology

3. 1. Introductory notes

By epistemology, we mean the theory of scientific cognition, which deals with scientific cognition in terms of its content, as opposed to the aspects of formal scientific cognition, which are dealt with by logic, methodology or technology of science. Epistemology understood in this way consists in applying the principles of the theory of scientific cognition and in analysing the epistemological problems encountered in scientific work.

The epistemological issues of sozology include, first of all, the analysis of the concept of this science, the construction of its definition, the definition of the subject of its research and emphasizing the characteristic feature of sozological scientific research, namely its interdisciplinarity.

The listed issues may not constitute an exhaustive set of epistemological problems of systemic sozology, but they are essential elements of the epistemological aspect of the structure of scientific cognition proper to this science.

3.2. The concept of system sozology

The term "sozology" derived from the Greek word, "sódzo", meaning "protect", "save", "help". Walery Goetel introduced this term to Polish scientific terminology in the early 1960s. According to him, this term means the protection of the natural human environment. Thirty years have passed since then. The term "sozology" was enriched with new content that thereby broadened its scope. An expression of this is the rich literature on the subject (Wodziczko 1935, 145-147; Wodziczko 1946, 8-15; Goetel 1966, 473-482; Michajłow 1972; Dołęga 1982, 328 -327; Zdrójkowska 1986; Wójcik 1986, 20-36; Eibl-Eibesfeldt 1982, 255-263) and this term is used more and more frequently to define sciences concerning environment protection.

In the analysis of the term "sozology" we consider two aspects: content and scope. In the connotational aspect, the methodological and thematic elements of this name are to be indicated, but in the aspect concerning its scope the designations marking its range are pointed to.

From the methodological (Marczuk 1985; Głowiak 1985a, 104-126; Juda 1978, 151-180; Tomaszewski 1979, 161-188; Głowiak 1979, 189-224) standpoint of the content of the name "sozology", the methods serving to research the object of this science are mainly referred to. Here the empirical, humanist, philosophical and systemic methods are distinguished. This issue will be discussed in more detail in the next chapter. From the thematic standpoint (Jacniacki 1989; Skoczylas, 1986; Leńkowa 1986; Stromenger 1988; Flemming 1983; Korczak 1984; Ginsbert-Gebert 1991; Fiedor 1990; Biela 1984; Wolański 1989, 31-56) of the term "sozology" the questions and problems within the range of scientific sozological research should be stressed. For example, problems and issues such as:

- Factual description of the state of nature in Poland and the world;

- Identification of objects that pollute and destroy the human natural environment;
- Conducting technological research to introduce purifying equipment and technology, which is not a burden on the environment;
- Studying the influence of changed environment on live organisms and human beings;
- Creating legal and administrative safeguards on a national and international scale to implement environment protection programmes;
- Moral and ethical awareness-raising sensitive to the quality of the natural human environment;
- Education — on various levels of the education system — in the spirit of sensitivity to the value of the human natural environment.
- Finding the means to decrease the pollution of the environment and eliminate the sources of its pollution; study of environmental impact on human mental state; Conducting medical research into new diseases that have arisen under the influence of a changed environment;
- Safeguarding the "pure" genetic reserves.

The above list of issues and problems is not complete, but sufficiently illustrates the rich and varied content of the concept of sozology.

The aspect of the name "sozology" (Grączewski 1972; Tyczka i Ponikowska 1983; Skinder 1991; Kozłowski 1990, 377-383; Nikonorow 1990, 321-332; Sommer 1990b, 365-376) concerning its scope covers problems and questions concerning animated and non-animated nature and the anthroposphere. All these areas are considered from the viewpoint of protecting the natural properties of specific parts of nature and their influence on human life and health. In this aspect, which is characteristic for sozology, is to be found the study of the natural properties of the animated and non-animated objects and their properties created under the influence of human activity. This research also concerns the newly arisen properties of the environment and their influence on the life and health of humanity, and also their influence on the condition of other species living on the Earth.

3.3. A definition of systemic sozology

In the initial phase of the birth and development of new science, difficulties arise in defining it. Sozology too has not yet emerged from the initial phase of its development, even though the problems of environment protection had already been taken up in the 19th century, and it continues to contend with similar difficulties.

From the definitions of sozology we choose two, given by W. Michajłow:

D1 "Sozology, the science of nature conservation, deals with the causes, immediate effects and further consequences of changes occurring as a result of human economic and social activity, both in natural and previously deformed natural systems in a smaller or larger area of the biosphere. Their scope covers effective methods of preventing consequences of human activity in the natural environment that are negative for societies, or at least indicates the possibilities of their maximum mitigation" (Michajłow 1977, 159).

D2 "Sozology is the science of causes and immediate effects, as well as further consequences of transformations taking place both in natural and previously deformed natural systems in a smaller or larger area of the biosphere as a result of human social and economic activity and effective methods of preventing them from having negative consequences for societies, or at least of the possibilities of their maximum mitigation" (Michajłow 1975, 50. 76).

The above definitions of sozology are very extensive and define in detail the subject, tasks and scope of research of this science. These terms suggest that sozology is interdisciplinary, which determines the selection and construction of research methods used in this science. These definitions, however, do not take into account the need for holistic views in sozological studies.

In this paper we are proposing the following definition of sozology:

D3 Sozology is defined as the science of the systemic protection of the biosphere from the destructive effects on it from the anthroposphere.

In this formulation the following expressions used in this definition require explanation: "systemic protection", "biosphere", "anthroposphere", "destructive effects".

"Systemic protection" — this expression is connected with the systemic approach to scientific research, which is characterized by seeing the problems involved as a totality and at the same time indicates relations between the elements internal to the system and between the system and its environment. By system (Podsiad i Więckowski 1983, 380-381; Bocheński 1988, 235-248; Młynarski 1974; Klira 1976; Sadowski 1978; Bartalanffy 1984; Lubański 1982, 14-70; Gasparski i Miller 1981) we mean a combination of different elements that are interconnected, interacting with each other and forming a whole in some way. This term refers to the philological meaning of the term "system" (gr. *systema*) and emphasizes such an arrangement of elements which forms a certain whole conditioned by the constant order of its components in the real world or the sphere of human cognition. The system is a whole, in which the elements are interconnected by interaction relations and constitute its structure. Every open system has its own environment. In nature and human cognition there are mainly open systems. The environment is a reality that comes or may come into contact with the system. "Systemic protection" — this expression is connected with the holistic and comprehensive approach of man to the protection of nature in the sphere of science, technology, pedagogy and didactics.

The term „biosphere" (Biosfera i jej zasoby 1976; Witkowska 1973) means the space inhabited by living organisms. This space includes the following areas:

- the surface of the earth and its upper layer, about 2-3 km deep into the lithosphere (only bacteria are found deeper in the earth's crust);
- the lower part of the atmosphere, up to a height of a few hundred meters (higher, bacteria, spores and very small insects float in the atmosphere);
- the entire hydrosphere, that is, all the waters on the globe. A detailed analysis of this concept is carried out in the Biosphere chapter.

The term "anthroposphere" means the whole space of the various human activities, i.e. economic, social, cultural, political, scientific, creative, and manufacturing. We have analysed this concept in detail in chapter Antroposphere.

The term "destructive influence" means the whole space where the various human activities take place, which comes into conflict with the biosphere, which changes the natural environment of life and causes structural genetic changes in some plants and animals, including humans; it also influences the chemical and biological balance in the biosphere.

3.4. The subject and scope of research on systemic sozology

The object of study of sozology in a general sense is the mutual interaction of the biosphere and the anthroposhere. In traditional language this is the material object of study of this science. On the other hand, the formal object of study of sozology is the protection of the biosphere from the destructive effects on it of the anthroposphere. This aspect of protection constitutes the specific features of sozology and its distinction from other sciences of the biosphere and anthroposphere.

The range of sozological research covers — using this characterization of its object of study — animated and non-animated nature, by which is understood the cosmo-bio-geographical environment of life, succumbing to the influence of the actions of the anthroposphere to undergo various changes, and sometimes complete destruction.

Within the scope of the object of study of sozology understood in such a way come plants and animals, their genetic structure and proper development, and also the developmental interference caused by the effects

of the anthroposphere. The physical environment also belongs to the range of sozological research — in which the biosphere exists i.e. the atmosphere, the hydrosphere, the lithosphere and the cosmosphere.

After this general discussion of the subject of sozology research, it is necessary to specify in detail the issues raised in the framework of sozological research. These issues fall within the scope of sozology research and concern the biosphere and anthroposphere and the relations between them. Among the questions concerning the biosphere it is necessary to enumerate the problems of a biological and biologico-genetic nature. The tasks related to this problem boil down to the description of the current state of the biosphere taking into account its environment: atmospheric, water, geological, and even cosmic.

Within the range of sozological issues related to the anthroposphere the problems concerning the state of the biological and biologico-medical human populations in specific countries and on whole continents need to be stressed as do the problems that emerge alongside the development of sozotechnology (Goetel 1971; Głowiak i Pecyna 1985, 129-156), sozopsychology (Biela 1984), sozoeconomy (Leszczyński 1978, 95-116; Winnicki 1985, 323-336; Zabierowski 1973, 363-386), ecological law (Brzeziński 1973, 117-150; Sommer 1990a; Sommer 1987), environmental ethics (Ślipko 1988, 22-75; Aleksandrowicz 1979; Woronowski 1990, 142-159; Woronowski 1991, 152-154).

In connection with the destructive effects of the anthroposphere on the biosphere various problems appearing in connection with the following dangers are indicated:

- the physical environment of the biosphere (air, water, soil);
- the biological environment;
- the life and health of humanity;
- life in small, medium-sized, big and huge macroregions;
- specific populations, and even whole species or breeds, both of fauna and flora;
- the landscape, groups of plants and animals.

Having all of this in mind it is necessary to stress once again, that the object of sozological research is the influence of human activity on nature and the ways and means of protecting it.

4. Methodology of system sozology

4.1. Introductory note

The material presented in this chapter does not pretend to be the final solution to all problems related to the methodology of sozology. Rather, it's about making them clear and formulating them. First of all, it should be noted that there is no single, characteristic method used in sozology, because its interdisciplinary nature forces it to use many methods: empirical, humanistic, philosophical and systemic. Groups of these methods determine the content of each paragraph of this chapter.

4.2. Empirical methods in systemic sozology

The basic methods used in empirical sciences include scientific observation, which can be direct and indirect, and also quantitative and qualitative. Similar observations are also made in sozology (Ajdukiewicz 1985a, 295-296; Ajdukiewicz 1985b, 371-373; Ajdukiewicz 1965, 227-337; Ziembiński 1977, 151-152; Pabis 1985, 59-63; Menne 1985, 108-109; Heller 1988, 104-112, 127-134; Iżewska 1987, 433-444), namely:

- direct observation by natural cognitive powers;
- Indirect observation by means of different instruments and complicated test equipment;
- direct quantitative observation of changes in the environment or in organisms;
- direct qualitative observation of changes in the environment and in the bodies evaluated as advanced, i.e. qualitative changes;
- indirect quantitative observation of quantitative changes in the environment and organisms recorded using quantitative measures;
- indirect qualitative observation that, based on quantitative changes in the environment and in organisms, leads to the qualitative changes taking place in them.

Besides, the following scientific observations are made in sozology: satellite (Winogradow 1983), monitoring (Głowiak, Kempa i Winnicki 1985; Głowiak 1985b, 93-104; Skinder 1991, 45-53), laboratory (Szaynoka 1990; Grzybowska 1974; Przeździecki 1980).

Satellite observations make it possible to record pollution over large areas of the globe. These observations, although they belong to modern methods, already have a history in which we can distinguish three periods. The first (initial) is related to taking pictures by ballistic missiles and balloons; covers the period 1946-1961 (these methods have not yet been completely abandoned). The second (experimental) distinguishes attempts with photos and satellite images undertaken in 1960-1972; at this time, the number of experimental works was decreasing and the number of practical works was increasing. The third (scientific and practical) lasts until today, and is characterized by the use of information from satellite observations.

Sozological observations are made from the following satellite vehicles:

- from ballistic missiles (orbital flight altitude is between 80 and 150 km);
- from manned spacecraft and manned orbital stations (flight altitude between 150 and 600 km);
- from artificial Earth satellites (flight altitude is from 600 to 2000 km); from automatic and manned interplanetary stations (planned flight range from 60,000 to 150,000 km);
- from the lunar geophysical observatory (range 400,000 km).

Following features characterize the materials obtained from the above observations:

- horizontal integration consisting in registering vast areas in one image;
- vertical integration consisting in registering different components of the geosphere in one image (e.g. atmosphere, hydrosphere, lithosphere, biosphere and anthroposphere);
- dynamic integration consisting in the use of a uniform recording system in consecutive images of a given area in specific time intervals.

Moreover, it should be noted that the development of Earth's satellite research has allowed improving their technique and methodology, namely:

- determine the technical conditions for taking satellite images (spatial and spectral resolution of the measuring equipment); take into account the sphericity of the Earth when processing satellites images; select appropriate electromagnetic spectra for recording by the given apparatus; develop the best means of obtaining information, encoding and storing it;
- define the natural conditions of satellite imagery (spectral ranges, cloudiness, the concentration of aerosols and their time and spatial distribution, absorption properties and emissivity of various objects, natural phenomena and their time and spatial cyclicity);
- improve the methodology of interpretation; determine the rules of optical, geometric and thematic generalization; receive small-scale satellite imagery, obtained for the first time on test polygons during complex geophysical experiments; establish a methodology for data calibration and extrapolation; use the data in science and practice; develop quantitative and automatic methods of information transfer and create satellite geoinformation subsystems.

The outlined methodological issues related to scientific satellite observation of the Earth are of interest to many authors from various disciplines and constitute the basis of interdisciplinary and international sozological research of the Earth environment.

Monitoring belongs to a special type of scientific observation that allows for the integration of results, and with the automatic transfer of information and its computer recording - also for instant information about the state of the environment in many aspects, as well as for quick assessment and diagnosis.

Laboratory analyses of air, water and soil serve as a basis for recognizing the current living environment, and laboratory tests of organisms and humans allow to as-

sess the condition of these organisms and predict adaptation trends in organisms to the changing environment. The detailed methods used here include:

- spectroscopic (optical) methods related to the effect of radiation on matter, e.g. visible and ultraviolet absorption spectrophotometry, infrared spectrophotometry, atomic absorption spectrophotometry, emission spectral analysis, turbidimetry and nephelometry;
- electrochemical methods for testing the effects accompanying the flow of current through the test solution or caused by reactions on electrodes immersed in the solution, e.g. potentiometers, electrolysis, clometry, polarography, conductometry;
- chromatographic methods consisting in separating the tested mixtures in stationary and mobile systems and determining their components by any method;
- other methods, e.g. radiational, activational, volumetric;
- methods used in determining the main air pollutants:
  - ✓ gasometric method for measuring CO and C02;
  - ✓ conductometric method;
  - ✓ infrared analysis method;
  - ✓ colorimetric method;
  - ✓ iodometric method;
  - ✓ the sulphate and sulphuric acid method;
  - ✓ method for the determination of nitric oxides using a live ion exchanger (indirect method);
  - ✓ potentiometric method using an ion-selective electrode;
  - ✓ method for determining benzene in the air without enrichment of the sample;
  - ✓ method of determining benzene in the air with sample enrichment;
  - ✓ method for determining the qualitative composition of the hydrocarbon mixture;
  - ✓ method of determining acetone vapours in the air (infrared spectrophotometry), colourimetric method for determining ozone;
  - ✓ method of hydrogen chloride content in the air;
  - ✓ methods allowing to determine the physicochemical properties of dust:
  - ✓ determination of dust density,
  - ✓ grain dust analysis.
  - ✓ determination of alkali metals and alkaline earth by flame photometry,
  - ✓ determination of Cu and Cr content by atomic absorption,
  - ✓ methods of measuring the dustiness of industrial gases,
  - ✓ methods of measuring dust fall.

"Measurement" deserves special attention in scientific observation (Ajdukiewicz 1985c, 356-364; Marczuk 1985; Cackowski 1987, 441). The essence of scientific quantitative observations is the measurement, the value of which depends on the measuring equipment. A person conducting the research may register the measurement result indirectly, i.e. automatically, or directly.

Based on the conducted scientific observations, a description is made (Czeżowski 1969a, 136-142; Menne 1985, 112-113; Ajdukiewicz 1985b, 34. 408; Motycka 1990, 227-248), the value of which depends on the reliability of the observation carried out and the terminology used, which is characteristic for a given field of science. In our case, it is always about the terminology of sozology. In the end, this description creates, in some sense, a scientific fact (Hempel 1968, 23-27; Kłósak 1980, 124-126, 133-136; Mazierski 1969, 31-39, 63-82; Kamiński 1981, 103, 170, 172), which forms the basis for building explanatory, evaluative and reporting theories.

At this point, it is important to emphasize the importance of measuring equipment (Such 1985, 120-131; Cackowski 1987, 441) in scientific quantitative observations in the field of sozological research. This apparatus allows the recording of quantitative changes in the natural environment of life and quantitative changes in the living organisms, especially in humans. More and more "sensitive" measuring equipment is required, i.e. recording even the smallest amounts of harmful substances for life.

4.3. Humanistic methods in systemic sozology

Sozology must also take into account certain methods of the humanities or natural and mathematical sciences. In the area of sozological research, in which such methods must be applied, there is man, his biological and psychological state, his economic activity in a threatened environment, and ethical and moral aspects of all human activity.

In sozological research on the human situation in a threatened environment, many psychological and ethno-psychological methods should be taken into account, without excluding introspection, because in these studies it is impossible to completely ignore internal experience. Therefore, when reading tests, questionnaires and surveys, one should also use methods of understanding and interpreting the statements of the respondents (Pieter 1963, 126-147; Pieter 1969, 124-252; Skórny 1966; Góralski 1974; Bielecki 1986, 8-10; Bielecki 1990, 110-139; Kościuch 1990; Ostrowska i Wójcik 1986, 133-223; Siek 1982; Siek 1986; Lubański 1989, 209-220).

The characteristic methodological features of the humanities include the understanding, intuitive approach to the whole and evaluation of values (Czeżowski 1969b, 38-39; Ajdukiewicz 1985a, 306-307; Kamiński 1989a, 13-32). In these sciences K. Ajdukiewicz (Ajdukiewicz 1985a, 309 -310; Czeżowski 1969b, 36-38.; Kamiński 1981, 166-173) distinguishes three methodological types of conduct, namely:

- explanatory or nomothetic;
- evaluative or axiological;
- reporting or idiographic.

The explanatory or nomothetical type (*nomos* - law) characterizes both the humanities and the natural sciences and consists in collecting scientific facts, discovering laws and explaining them by means of rules and hypotheses, as well as in constructing theories explaining wider areas determined by such facts.

The reporting or idiographic type (*idios* - peculiar, specific) consists of recognizing particular facts as such, reporting on these facts and describing them in their specific form; it does not seek to discover the laws that govern facts.

The evaluative or axiological type is specific to the humanities. The most important concepts in the humanities are axiological concepts such as truth, beauty and good. This type of methodological approach causes many difficulties, because it has to take into account various value systems and based on one of them to evaluate the studied object.

4.4. Philosophical methods in system sozology

A still valid problem in the methodology of philosophy is the development of appropriate methods for particular philosophical disciplines. The research conducted in this area provides rich input for methodological analysis (Kamiński 1989b, 71-88; Kamiński 1989c, 249 -262; Kamiński 1989d, 321-330; Morawiec 1974; Morawiec 1990a, 61-78; Morawiec 1990b, 7-22; Gogacz 1991a, 159-166; Gogacz 1991b, 7-18). It is worth mentioning here, first of all, the philosophical analysis, in which we can distinguish two types. The first type is an ontological analysis in the strict sense, used in the philosophy of being. The second type is an analysis focused on the type of being that occurs in nature, i.e. material being. We do not undertake at this point the task of presenting the discussion on the ontological analysis in the broader sense and its ontological implications of a reducible nature, but we only wish to mention the significant role played in this discussion by Kazimierz Kłósak (Kłósak, 1980, 79 -80, 94, 105-106, 150-151), who was the first to work out the methodology of philosophy of nature; one should also mention the scientific achievements of Mieczysław Albert Krąpiec (Krąpiec 1960, 64-72; Kamiński 1967, 5-40; Kamiński 1979, 71-85; Kamiński 1989e, 307-320), Stanisław Kamiński and Edmund Morawiec (Kamiński 1960, 64-72; Kamiński 1967, 5-40; Kamiński 1979, 33-50; Kamiński 1989e) in the field of the methodology of the philosophy of being and other philosophical disciplines.

We have to use ontological analysis in a broader and more precise sense to solve sozological issues and problems if we do not want to confine ourselves to explanations that can be obtained in languages and with the help of the theory of empirical sciences, but try to take a step forward, i.e. to interpret scientific sozological facts in the light of philosophy, that is to translate their scientific presentation into the language of philosophy and, within the framework of these theories, explain the facts mentioned to meet the philosopher's requirements and link them with the categories of being in nature.

In scientific sozological research, as in any type of scientific research, the problem of truth, and thus its concept, definition and criteria, is particularly important. In these studies, based on the classic definition of truth (Twardowski 1965, 315-336; Stępień 1983, 49-83; Rosnerowa 1975, 1243 -1261; Krajewski 1963, 211-220; Woleński 1990, 67-120; Lojewska 1986, 107-116), the aim is to obtain and transmit true scientific information, decisive for the proper assessment of the condition of the biosphere and anthroposphere, and for taking possible remedial measures. True information about the state of the biosphere and anthroposphere, and its transmission are among the basic ethical requirements for scientists, and thus also for researchers of life and its environment. We will return to the philosophical issues in the final fragments of the work when discussing the issue of the anthroposphere.

4.5. Systemic methods in system sozology

In modern theories of science, functioning in the current of Thomistic philosophy, a systemic theory of science should be distinguished, which is formulated based on the general theory of systems and its applications (Klira 1976; Bartalanffy 1984; Latawiec 1990, 37-54). The works of M. Lubański (Lubański 1979, 13-164; Lubański 1978, 101-144; Lubański 1981, 5-20.) and S. W. Ślaga (Ślaga 1982, 119-28; Ślaga i Lubański 1979, 117-152; Ślaga i Lubański, 1-13; Ślaga 1987, 174-201) should be taken into account here in particular devoted to the theoretical approaches to modern science in the systemic aspect and the applications of these approaches to describe and solve specific problems.

Science in the apragmatic stage (Ajdukiewicz 1965, 177) can be defined as a system of logically ordered, justified, intersubjectively verifiable and communicative statements (sentences). This formulation expresses a tendency in research in the field of philosophy of science, known since the times of Aristotle. S. Kamiński expresses this thought in the following way: "Theoretical knowledge is generally called cognition, which is epistemologically and methodologically advanced or explanatory, even in the broad sense of the latter term. This advancement of knowledge takes place when it is specialised (essentially recognizes its subject in one aspect, i.e. at one angle), empirically (at least genetically) or rationally validated in a controlled, content and logical manner, and expressed in an informative language (intersubjective, that is, unequivocally, understandable by experts)" (Kamiński 1982a, 11-12; Kamiński 1982b, 129-142; Kamiński 1982c, 125-130; Hajduk 1984).

Systemic research takes into account not only the subject and methodological aspects but also the social, sociological, educational, synthetic and dynamic aspects.

Let us recall the concept of a system from the previous chapter, namely that it is a set of various elements that are interrelated and interact with each other and constitute a whole in a certain respect. Scientific research in the field of sozology requires a systemic approach, both in terms of subject matter and in methodology. These studies use many methods and techniques to identify the current state of the biosphere and the anthroposphere and to demonstrate the need for measures to inhibit environmental degradation. The collection of all these methods and techniques creates a certain system of research possibilities in sozology.

The above remarks on the methodological issues of sozology show the complexity of these issues and postulate the need

for a more analytical discussion of all four methods used in sozology. The synthetic presentation of empirical, humanistic, philosophical and systemic methods are merely an attempt to comprehensively present the methodological issues of sozology, which is still valid and awaiting decisions.

5. Main issues of systemic sozology and its specificity

1. The main problems of systemic sozology revolve around the following issues:

- The state of the environment in Poland, the European Union and the world;
- Sources of pollution and threats to the natural and social environment;
- The impact of the changing environment on life on Earth and human life and health;
- Measures and ways to protect the natural and social environment.

All these problems and issues are dealt with in systemic sozology in the following spheres in which life is created and developed, namely:

- atmosphere;
- hydrosphere;
- lithosphere;
- cosmosphere and magnetosphere;
- biosphere;
- anthroposphere.

All of these spheres in which there are various life forms have their structure with specific properties that determine the functioning of these forms of life and of man on Earth. Systemic sozology considers the state of these spheres, changes taking place in them, the impact on human life and health, and looks for ways and means of protection in all elements of the environment.

2. Bearing in mind the assumption of the unity of sciences, especially the unity of their logical structure, the use of a uniform methodological system in them, which constitute the most enduring feature of modern science, and the influence of one research on another and their interdependencies (Prandecka 1991, 9-20; Fox, Garbuny, and Hooke 1968, 13-30; Nagel 1970, 7-9; Czeżowski 1967, 17-27; Czeżowski 1973, 11-18; Kamiński 1973, 233-264), it becomes clear that interdisciplinarity is an indispensable feature of scientific-creating processes of sozology and at the same time confirms the assumed unity of sciences.

Scientific issues related to sozology make interdisciplinary research necessary in sozology. Solving it requires cooperation with the following sciences: ecology, geology, economics, technical and technological sciences, ethics and pedagogy (Myczkowski 1973, 97-106; Dubel 1991, 1-8; Jarzyńska 1991, 1-12; Szyrej 1991, 1-14), sozopsychology, sozoetics or ecological ethics, ecological or sozological law, ecological policy. This cooperation between the emerging science, sozology, and the sciences mentioned above gives rise to new scientific fields, such as sozotechnics, sozoeconomics, sozopsychology, sozoetics or ecological ethics, ecological or sozological law, ecological policy (Aleksandrowicz i Waszczenko 1990, 83-92; Gutt 1990, 22-70).

In general, it can be said that sozological issues are present in many sciences (Stępień 1974, 40-88.), and its specific issues are particularly present in such disciplines as: medical sciences, biological sciences, earth sciences and spatial planning, technical sciences, economic sciences, legal and administrative sciences, social sciences and humanities. It should be added here that neither cosmophilosophy, nor biophilosophy, nor anthropophilosophy can remain indifferent to sozological scientific problems.

Research in the field of sozology as a science of systemic protection of the biosphere against the destructive influence of the anthroposphere, out of necessity demand that the emerging problems be solved exhaustively and comprehensively. Moreover, this science is unifying research in many scientific disciplines. On its territory, theories that integrate the achievements of various sciences may be formed.

Conclusions

This study includes a note on the history of sozology, describes the characteristics of the concept of systemic sozology, analyses the basic issues of epistemology and systemic sozology methodology, and

presents the main and specific problems of systemic sozology. Conducted research in this area still requires cooperation with methodologists and logicians in order to work on epistemology and methodology of systems sozology. This cooperation should also take into account the history of national and international environmental issues.

Bibliography

Ajdukiewicz, Kazimierz. 1965. *Logika pragmatyczna*. Warszawa: Wydawnictwo Naukowe PWN.

Ajdukiewicz, Kazimierz. 1985a. „Metodologiczne typy nauk." W *Język i poznanie,* red. Kazimierz Ajdukiewicz, t. 1, 295-296. Warszawa: Wydawnictwo Naukowe PWN.

Ajdukiewicz, Kazimierz. 1985b. „Subiektywność i niepowtarzalność metody bezpośredniego doświadczenia." W *Język i poznanie,* red. Kazimierz Ajdukiewicz, t. 2, 371-373. Warszawa: Wydawnictwo Naukowe PWN.

Ajdukiewicz, Kazimierz. 1985c. „Pomiar." W *Język i poznanie,* red. Kazimierz Ajdukiewicz, t. 1, 356-364. Warszawa: Wydawnictwo Naukowe PWN.

Aleksandrowicz, Julian, i Piotr Waszczenko. 1990. „Środowisko w perspektywie medycznej: humanizm ekologiczny szansą przetrwania." W *Człowiek, środowisko, zdrowie*, red. Jan Kopczyński, Andrzej Siciński, 83-92. Wrocław: Zakład Narodowy im. Ossolińskich.

Aleksandrowicz, Julian. 1979. *Sumienie ekologiczne*. Warszawa: Wiedza Powszechna.

Antoniewicz, Włodzimierz. 1975. „Religie dawnych Słowian." W *Religie w przeszłości* i *dobie współczesnej,* red. Helmer Ringgren. Warszawa: Książka i Wiedza.

Bartalanffy, Ludwig von. 1984. *Ogólna teoria systemów. Podstawy, rozwój, zastosowania*. Warszawa: Wydawnictwo Naukowe PWN.

Białkowski, Grzegorz. 1989. „Uczony jako sumienie i duchowy przewodnik społeczeństwa." *Zagadnienia Naukoznawstwa* 1: 3-10.

Biela, Adam (red.). 1984. *Stres psychiczny w sytuacji kryzysu ekologicznego. Badania z zakresu sozopsychologii*. Lublin: KUL.

Bielecki, Jan. 1986. *Wybrane zagadnienia psychologii*. Warszawa: ATK.

Bielecki, Jan. 1990. *Osobowość młodzieży niepełnosprawnej z zaburzeniami wzroku, słuchu, ruchu i mowy*. Warszawa: ATK.

Biosfera i jej zasoby. 1976, Warszawa: PWN.

Bocheński, Józef. 1988. „O systemie Wykład wygłoszony w ATK 1987-11-05." *Studia Philosophiae Christianae* 2: 235-248.

Brzeziński, Wacław. 1973. „Problematyka prawna ochrony środowiska." W *Człowiek i środowisko*, 117-150. Wrocław: Ossolineum.

Cackowski, Zdzislaw. 1987. „Obserwacja." W *Filozofia a nauka*. red. Maria Iżewska, 441. Wrocław: Zakład Narodowy im. Ossolińskich.

Carter, Brandon. 1974. "Large Number Coincidences and the Anthropic Principle in Cosmology." In *Confrontation of Cosmological Theories with Observational Data,* edited by Malcolm Longair, 291-298. Dordrecht: Springer.

Cichy, Danuta (red.). 1997. *Edukacja środowiskowa*. Warszawa: Instytut Badań Edukacyjnych.

Cichy, Danuta (red.). 1998. *Kształcenie ekologiczne dorosłych*. Warszawa: Instytut Badań Edukacyjnych.

Cichy, Danuta (red.). 2000. *Podstawy kształcenia dla zrównoważonego rozwoju*. Warszawa: Instytut Badań Edukacyjnych.

Coreth, Emerich. 1976. *Was ist der Mensch? Grundzüge einer philosophischem Anthropologie*. Innsbruck: Tyrolia.

Czeżowski, Tadeusz. 1967. „O jedności nauki." W *Fragmenty filozoficzne. Księga pamiątkowa ku czci Profesora Tadeusza Kotarbińskiegow osiemdziesiątą rocznicę urodzin*, red. Tadeusz Czeżowski, 17-27. Warszawa: Wydawnictwo Naukowe PWN.

Czeżowski, Tadeusz. 1969a. „O metodzie opisu analitycznego." W *Odczyty filozoficzne*, red. Tadeusz Czeżowski, 136-142. Toruń: Wydawnictwo Naukowe PWN.

Czeżowski, Tadeusz. 1969b. „O naukach humanistycznych." W *Odczyty filozoficzne*, red. Tadeusz Czeżowski, 38-39. Toruń: Wydawnictwo Naukowe PWN.

Czeżowski, Tadeusz. 1973. „O związku między naukami aksjomatycznymi a naukami empirycznymi." Studia pedagogiczne 28: 11-19.

Dobell, Clifford. 1941. "Michał Siedlecki (1873-1940) a Founder of Modern Knowledge of the Sporozaa." *Parasitology* 33: 50.

Dogiel, Gerard. 1984. *Antropologia filozoficzna*. Kraków: Instytut Teologiczny Księży Misjonarzy.

Dołęga, Józef M. 1982. „Z zagadnień sozologii." *Z Zagadnień Filozofii Przyrodoznawstwa i Filozofii Przyrody* 4: 328 -327.

Dołęga, Józef M. 1985. „Implikacje filozoficzne empiriologicznej fenomenologii ruchu." *Z Zagadnień Filozofii Przyrodoznawstwa i Filozofii Przyrody* 7: 167-168.

Dołęga, Józef M. 1986, *Stosunek ruchu do materii w ujęciu klasycznej filozofii przyrody*. Warszawa: ATK.

Dołęga, Józef M. 1988. *Kreacjonizm i ewolucjonizm. Ewolucyjny model kreacjonizmy a problem liominizacji.* Warszawa: ATK.

Dubel, Krystyna. 1991. „Edukacja ekologiczna jako warunek zrównoważonego rozwoju w Polsce." W *III Międzynarodowe Seminarium Ekologiczne, Pokrzywna 1991*, 1-8. Opole: Wojewódzki Ośrodek Informacji Naukowej, Technicznej i Ekonomicznej Urzędu Wojewódzkiego.

Dudzińska, Marzenna R. i Lucjan Pawłowski (red.). 1993. *Ochrona środowiska w nauczaniu i wychowaniu*. Lublin.

Eibl-Eibesfeldt, Irenäus. 1982. *Galapagos. Arka Noego pośród Pacyfiku*. Katowice: Śląsk.

Eliade, Mircea. 1966. *Traktat o historii religii*. Warszawa: Książka i Wiedza.

Eliade, Mircea. 1988. *Historia wierzeń i idei religijnych*. Warszawa: „Pax".

Fiedor, Bogusław. 1990. *Przyczynek do ekonomicznej teorii zanieczyszczenia i ochrony środowiska*. Wrocław: Zakład Narodowy im. Ossolińskich.

Filipek, Józef. 1973. „Podstawy prawne ochrony przyrodniczego środowiska człowieka w niektórych krajach poza Polską." W *Ochrona przyrodniczego środowiska człowieka*, red. Władysław Szafer, 141-147. Warszawa: Wydawnictwo Naukowe PWN.

Flemming, Günther. 1983. *Klimat - środowisko – człowiek*. Warszawa: Państwowe Wydawnictwo Rolnocze i Leśne.

Fox, Russell, Max Garbuny, i Robert Hooke. 1968. *Nauka o nauce: metody objaśniania zjawisk fizycznych*. Warszawa: Wydawnictwo Naukowe PWN.

Gasparski, Wojciech, i Danuta Miller (red.). 1981. *Nauka, technika, systemy*. Wrocław: Zakład Narodowy im. Ossolińskich.

Gavies, Paul C. W. 1986. „Zasada antropiczna." *Postępy Fizyki* 37: 213-259.

Gerwen, Jef van. 1990. „La paix Dieu Createur, la paix avec toute la creation." *Pro Mundi Vita* 13: 38-44.

Giedymin, Jerzy. 1964. *Problemy założenia rozstrzygnięcia. Studia nad logicznymi podstawami nauk społecznych.* Poznań: Wydawnictwo Naukowe PWN.

Ginsbert-Gebert, Adam (red.). 1991. *Ekonomiczne i socjologiczne problemy ochrony środowiska*. Wrocław: Zakład Narodowy im. Ossolińskich.

Głowiak, Bohdan i J. Pecyna. 1985. „Technologia oczyszczania gazów odlotowych." W *Podstawy ochrony środowiska*, red. Bohdan Głowiak, Edward Kempa, i Tomasz Winnicki, 129-156. Warszawa: Wydawnictwo Naukowe PWN.

Głowiak, Bohdan, Edward Kempa, i Tomasz Winnicki (red.). 1985. *Podstawy ochrony środowiska*. Warszawa: Wydawnictwo Naukowe PWN.

Głowiak, Bohdan. 1979. „Krążenie zanieczyszczeń w biosferze i metody tzw. monitoringu." W *Człowiek i środowisko*, red. Włodzimierz Michajłow, 189-224. Wrocław: Zakład Narodowy im. Ossolińskich.

Głowiak, Bohdan. 1985a. „Modele obliczeniowe." W *Podstawy ochrony środowiska*, red. Bohdan Głowiak, Edward Kempa, i Tomasz Winnicki, 104-126. Warszawa: Wydawnictwo Naukowe PWN.

Głowiak, Bohdan. 1985. „Rola monitoringu w ochronie środowiska." W *Podstawy ochrony środowiska*, red. Bohdan Głowiak, Edward Kempa i Tomasz Winnicki, 93-104. Warszawa: Wydawnictwo Naukowe PWN.

Goetel, Walery (red.). 1971. *Sozologia i sozotechnika*. Kraków: Wydawnictwo Naukowe PWN.

Goetel, Walery. 1966. „Sozologia - nauka o ochronie przyrody i jej zasobów." *Kosmos* 15: 473-482.

Gogacz, Mieczysław. 1973. *Ważniejsze zagadnienia metafizyki*. Lublin: KUL.

Gogacz, Mieczysław. 1979. „Filozoficzna konieczność istnienia aniołów jako celowych przyczyn dusz ludzkich." W *Człowiek we wspólnocie Kościoła*, red. Lucjan Balter, 87-116. Warszawa: ATK.

Gogacz, Mieczysław. 1985. *Człowiek i jego relacje. Materiały filozofii człowieka.* Warszawa: UKSW.

Gogacz, Mieczysław. 1986. „Akt istnienia (ipsum esse) według tomizmu konsekwentnego." *Studia Philosophiae Christianae* 2: 25-40.

Gogacz, Mieczysław. 1991a. „Wychowanie filozoficzne." *Studia Philosophiae Christianae* 1: 159-166.

Gogacz, Mieczysław. 1991b. „Podstawy odmian koncepcji Boga." *Studia Philosophiae Christianae* 2: 7-18.

Góralski, Andrzej. 1974. *Metody opisu i wnioskowania statystycznego w psychologii*. Warszawa: Wydawnictwo Naukowe PWN.

Grączewski, Jan. 1972. *Wpływ pogody na zdrowie człowieka*. Warszawa: PZWL.

Grzybowska, Jadwiga. 1974. *Zanieczyszczenia chemiczne. Oddziaływanie czynników współczesnego środowiska na organizm człowieka*. Warszawa: Wydawnictwo Naukowe PWN.

Gumański, Leon. 1983. *Wprowadzenie w logikę współczesną*. Toruń: UMK.

Gutt, Romuald W. 1990. „Problem wzorca lekarza i innych pracowników służby zdrowia." W *Człowiek, środowisko, zdrowie*, red. Jan Kopczyński, i Andrzej Siciński, 468-476. Wrocław: Zakład Narodowy im. Ossolińskich.

Hajduk, Zygmunt. 1984. *O akceptacji teorii empirycznej*. Lublin: KUL.

Hałaczek, Bernard, i Mieczysław Lubański. 1988. „Filozoficzne aspekty ekologii." *Chrześcijanin a Współczesność* 5: 11-17.

Heller, Michał. 1982. „Stworzenie a ewolucja." *Communio* 4: 58-66.

Heller, Michał. 1988. *Teoretyczne podstawy kosmologii*. Warszawa: Wydawnictwo Naukowe PWN.

Heller, Michał. 1990. „Zasada antropiczna." W *Dylematy ewolucji,* red. Michał Heller, i Józef Życiński, 150-158. Kraków: Znak.

Hempel, Carl G. 1968. *Podstawy nauk przyrodniczych*. Warszawa: Wydawnictwa Naukowo-Techniczne.

Ingarden, Roman. 1972. *Książeczka o człowieku*. Kraków: Wydawnictwo Literackie.

Iżewska, Maria (red.). 1987. *Filozofia a nauka*. Wrocław: Zakład Narodowy im. Ossolińskich.

Jacniacki, Kazimierz. 1989. Środowisko przyrodnicze i jego ochrona. Warszawa: Ludowa Spółdzielnia Wydawnicza.

Jarzyńska, Irena. 1991. „Kształcenie studentów nauczania początkowego w zakresie ochrony środowiska przyrodniczego człowieka." W *III Międzynarodowe Seminarium Ekologiczne, Pokrzywna 1991*, 1-12. Opole: Wojewódzki Ośrodek Informacji Naukowej, Technicznej i Ekonomicznej Urzędu Wojewódzkiego.

Jaworski, Marian. 1982. „Problem koncepcji filozofii." *Analecta Cracoviensia* 14: 1-9.

John Paul II. 1990. *Peace with God the Creator - Peace with All of Creation. Message for the 23. World Peace Day*. Rome.

Juda, Jan. 1978. „Zasady stosowania analizy w kształtowaniu środowiska." W *Człowiek i środowisko*, red. Włodzimierz Michajłow, 151-180. Wrocław: Zakład Narodowy im. Ossolińskich.

Kamiński, Stanisław. 1960. „Rola dedukcji w metafizyce." *Sprawozdania z Czynności Wydawniczej i Posiedzeń Naukowych oraz Kronika Towarzystwa Naukowego KUL* 11: 64-72.

Kamiński, Stanisław. 1967. „Metody współczesnej metafizyki." *Roczniki Filozoficzne* 1: 5-40.

Kamiński, Stanisław. 1973. „Stosunek między poznaniem empirycznym a nieempirycznym w nauce.", W *Z zagadnień kultury chrześciajńskiej*, red. Karol Wojtyła, 253-264. Lublin: TN KUL.

Kamiński, Stanisław. 1979. „Osobliwość metodologiczna teorii bytu." *Roczniki Filozoficzne* 2: 71-85.

Kamiński, Stanisław. 1981. *Pojęcie nauki i klasyfikacja nauk*. Lublin: TN KUL.

Kamiński, Stanisław. 1982a. „Typy wiedzy teoretycznej." *Analecta Cracoviensia* 14: 11-12.

Kamiński, Stanisław. 1982b. „O rozwoju teorii empirycznej." *Roczniki Filozoficzne* 3: 129-142.

Kamiński, Stanisław. 1982c. „O kryteriach wartościowania wiedzy teoretycznej." *Roczniki Filozoficzne* 2: 125-130.

Kamiński, Stanisław. 1989a. „Typy ludzkiej wiedzy." W *Jak filozofować? Studia z metodologii filozofii klasycznej*, red. Tadeusz Szubka, 13-32. Lublin: TN KUL.

Kamiński, Stanisław. 1989b. „Osobliwość metodologiczna teorii bytu." W *Jak filozofować? Studia z metodologii filozofii klasycznej*, red. Tadeusz Szubka, 71-88. Lublin: TN KUL.

Kamiński, Stanisław. 1989c. „Z metafilozofii człowieka." W *Jak filozofować? Studia z metodologii filozofii klasycznej*, red. Tadeusz Szubka, 249-262. Lublin: TN KUL.

Kamiński, Stanisław. 1989d. „O metodologicznej autonomii etyki." W *Jak filozofować? Studia z metodologii filozofii klasycznej*, red. Tadeusz Szubka, 321-330. Lublin: TN KUL.

Kamiński, Stanisław. 1989e. „Metodologiczne typy etyki." W *Jak filozofować? Studia z metodologii filozofii klasycznej*, red. Tadeusz Szubka, 307-320. Lublin: TN KUL.

Kamiński, Stanisław. 1989f. „Elementy logiki formalnej." W *Wstęp do filozofii,* red. Antoni Stępień, 239-269. Lublin: TN KUL.

Kierzkowski, Zbigniew. 1976. *Elementy informatyki. Technika, metody zastosowania*. Warszawa: Wydawnictwo Naukowe PWN.

Klira, George J. (red.). 1976. *Ogólna teoria systemów*. Warszawa: Wydawnictwo Naukowo-Techniczne.

Kłósak, Kazimierz. 1964. „Zagadnienie teleologicznej interpretacji przyrody we współczesnej neoscholastyce." W *Pod tchnieniem Ducha Świętego. Współczesna myśl teologiczna*, red. Marian Finke, 30-42. Poznań: Księgarnia Św. Wojciecha.

Kłósak, Kazimierz. 1966. „«Przyrodnicza» definicja duszy ludzkiej, jej uprawnienia i granice użyteczności naukowej." *Studia Philosophiae Christianae* 1: 192-195..

Kłósak, Kazimierz. 1968. „Immanencja i transcendencja człowieka w odniesieniu do przyrody." W *O Bogu i o człowieku*, red. Bohdan Bejze, 165-177. Warszawa: ATK.

Kłósak, Kazimierz. 1969. „Teoria kreacjonistycznych początków duszy ludzkiej a współczesny ewolucjonizm." *Analecta Cracoviensia* 1: 32-56.

Kłósak, Kazimierz. 1977. „Koncepcja bytu a filozofia Boga." W *Studia z Filozofii* Boga, red. Bogdan Bejze, 11-26. Warszawa: ATK.

Kłósak, Kazimierz. 1980. *Z teorii i metodologii filozofii przyrody.* Poznań: Księgarnia Św. Wojciecha.

Korczak, Cezary (red.). 1984. *Higiena - ochrona zdrowia*. Warszawa: PZWL.

Kornas, Stefan. 1986. *Współczesne eksperymenty medyczne w ocenie etyki katolickiej*. Częstochowa: Częstochowskie Wydawnictwo Diecezjalne.

Kościuch, Jan. 1990. *Projekcyjne metody badania osobowości*. Warszawa: ATK.

Kozłowski, Stefan, i Zbigniew Wróblewski (red.). 2000. *Wokół mnożnika cztery*. Lublin: KUL.

Kozłowski, Stefan. 1990. „Ochrona środowiska." W *Człowiek środowisko zdrowie*, red. Jan Kopczyński i Andrzej Siciński, 377-383. Wrocław: Zakład Narodowy im. Ossolińskich.

Krajewski, Władysław. 1963. „O pojęciach prawdy względnej." *Studia Filozoficzne* 3-4: 211-220.

Krąpiec, Mieczyław A. 1975. *Człowiek i prawo naturalne*. Lublin: KUL.

Krąpiec, Mieczysław A. 1960. „Metafizyka - ale jaka?" *Sprawozdania z Czynności Wydawniczej i Posiedzeń Naukowych oraz Kronika Towarzystwa Naukowego KUL* 11: 64-72.

Krąpiec, Mieczysław A. 1974. *Ja - człowiek. Zarys antropologii filozoficznej*. Lublin: KUL.

Krąpiec, Mieczysław A. 1981. „Język naturalny podmiotowo-orzeczeniowy (analiza sądów)." W *De ente et essentia. Przekład - komentarz - studia*, red. Mieczysław A. Krąpiec, 140-162. Lublin: KUL.

Krąpiec, Mieczysław A. 1985. *Język i świat realny*. Lublin: KUL.

Kuc, Leszek. 1978. „Z badań nad pjęciem «teoria» w szkole tomistycznej XV wieku." W *Studia z dziejów myśli świętego Tomasza z Akwinu*, red. Stefan Swieżawski i Jan Czerkawski, 47-90. Lublin: TN KUL.

Latawiec, Anna. 1990. „Symulacja zjawisk biologicznych widzina systemowo." *Studia Philosophiae Christianae* 2: 37-54.

Lisicka, Halina, Iwona Macek i Wojciech Radecki (red.). 1999. *Leksykon ochrony środowiska – prawo i polityka*. Wrocław: Prawo Ochrony Środowiska.

Leńkowa, Antonina (red.). 1986. *Człowiek przeciwko sobie?* Warszawa: PAX.

Leszczyński, K. 1978. „Rachunek społeczno-ekonomiczny w ochronie środowiska naturalnego." *Człowiek i środowisko* 95-116. Wrocław: Ossolineum.

Lubański, Mieczysław. 1978. „Człowiek, system, informacja." *Studia Philosophiae Christianae* 2: 101-144.

Lubański, Mieczysław. 1979. *Wprowadzenie do informatyki*. Warszawa: ATK.

Lubański, Mieczysław. 1981. „Zagadnenia filozoficzne w aspekcie systemowo-filozoficznym." *Roczniki Filozoficzne* 3: 5-20.

Lubański, Mieczysław. 1982. „Informacja – system." W *Zagadnienia filozoficzne współczesnej nauki. Wstęp do filozofii przyrody*, red. Michał Heller. Mieczysław Lubański, i Szczepan W. Ślaga, 14-70. Warszawa: ATK.

Lubański, Mieczysław. 1989. „Analogia a interpretacja." *Studia Philosophiae Christianae* 1: 209-220.

Łojewska, Maria I. 1986. *Filozofia nauki*. Warszawa: Politechnika Warszawska.

Marczuk, Gurij I. 1985. *Modelowanie matematyczne problemów środowiska naturalnego*. Warszawa: Wydawnictwo Naukowe PWN.

Maryniarczyk, Andrzej. 1985. *Metoda separacji a metafizyka*. Lublin: KUL.

Masi, Roberto, e Enrico Nicoletti. 1961. *Cosmologia.* Roma: Desclee e C.

Mazierski, Stanisław. 1969. *Prolegomena do filozofii przyrody inspiracji arystotelosowsko-tomistycznej*. Lublin: TN KUL.

Mazurski, Krzysztof R. 1998. *Podstawy sozologii.* Wrocław: Sudety.

Menne, Albert. 1985. „Wprowadzenie do metodologii. Elementarne ogólne metody pracy naukowej w zarysie." *Miscellanea Logica* 3: 108-109.

Michajłow, Włodzimierz. 1972. *Sozologia a problemy środowiska życia człowieka*. Wrocław: Ossolineum.

Michajłow, Włodzimierz. 1975. *Sozologia i problemy środowiska zycia człowieka*. Wrocław: Zakład Narodowy im. Ossolińkich.

Michajłow, Włodzimierz. 1977. „Sozologia - nauka o ochronie i kształtowaniu środowiska." W *Nowe specjalności w nauce współczesnej*. red. Tadeusz Kotarbiński, Wanda Osińska, i Eugeniusz Gehlewicz, 162-163. Wrocław: Zakład Narodowy im. Ossolińskich.

Miklaszewski, Jan. 1934. "Prof. dr. Bolesław Hryniewicki w 35 rocznicę działaności naukowo-badawczej, pedagogicznej i społecznej." *Acta Societatis Botanicorum Poloniae* 11: 1-12.

Młynarski, Stefan. 1974. *Elementy teorii systemów i cybernetyki*. Warszawa: Wydawnictwo Naukowe PWN.

Morawiec, Edmund. 1973. „Pozycja pierwszych zasad w koncepcji metafizyki J. Maritaina." *Studia Philosophiae Christianae* 1: 179-205.

Morawiec, Edmund. 1974. „Rola intuicji w przyjmowaniu założeń te metafizyce ogólnej u J. Maritaina." Warszawa: ATK.

Morawiec, Edmund. 1990a. „Początkowa postać wiedzy racjonalnej o przyrodzie." *Studia Philosophiae Christianae* 1: 61-78.

Morawiec, Edmund. 1990b. „Początkowa postać empirystycznej i apriorystycznej wiedzy o świecie." *Studia Philosophiae Christianae* 2: 7-22.

Motycka, Alina. 1990. „O osobliwości opisu w nauce." *Studia Epistemologiczne* 1: 227-248.

Myczkowski, Stefan. 1973. „Ochrona przyrody w szkolnictwie i wychowaniu." W *Ochrona przyrodniczego środowiska człowieka*, red. Władysław. Szafer, 97-106. Warszawa: Wydawnictwo Naukowe PWN.

Nagel, Ernest. 1970. *Struktura nauki: zagadnienia logiki wyjaśnień naukowych*. Warszawa: Wydawnictwo Naukowe PWN.

Nikonorow, Maksym. 1990. „Główne skażenia ekologiczne żywności." W *Człowiek środowisko zdrowie*, red. Jan Kopczyński, i Andrzej Siciński, 321-332. Wrocław: Zakład Narodowy im. Ossolińskich.

Nowaczyk, Adam. 1985. *Logiczne podstawy nauk ścisłych*. Warszawa: IFiS PAN

Nowak, J. 1973. "Prawodawstwo ochrony przyrody i środowiska życiowego człowieka w Polsce." W *Ochrona przyrodniczego środowiska człowieka*, red. Władysław Szafer, 123-140. Warszawa: Wydawnictwo Naukowe PWN.

Ostrowska, Krystyna, i Dobrochna Wójcik. 1986. *Teorie kryminologiczne*. Warszawa: ATK.

Pabis, Stanisław. 1985. *Metodologia i metody nauk empirycznych*. Warszawa: Wydawnictwo Naukowe PWN.

Pannenberg, Wolfhart. 1978. *Kim jest człowiek? Współczesna antropologia w świetle teologii*. Paris: Editions du dialogue.

Papuziński, Andrzej (red.). 2000. *Polityka-Ekologia-Kultura: Społeczne przesłanki i przejawy kryzysu ekologicznego*. Bydgoszcz: Wyższa Szkoła Pedagogiczna.

Pasenkiewicz, Kazimierz. 1979. *Logika ogólna*. Warszawa: Wydawnictwo Naukowe PWN.

Pieter, Józef. 1963. *Przedmiot i metoda psychologii*. Wrocław: Zakład Narodowy im. Ossolińskich.

Pieter, Józef. 1969. *Sporne problemy psychologii*. Warszawa Wydawnictwo Naukowe PWN.

Podsiad, Antoni, i Zbigniew Więckowski. 1983. *Mały słownik terminów i pojęć filozoficznych*. Warszawa: PAX.

Półtawski, Andrzej. 1990. „Roman Ingarden - metafizyk wolności." Studia Filozoficzne 2-3.

Prandecka, G. 1991. „Strategia ochrony środowiska - podstawy interdyscyplinarne." W *Ekonomiczne i socjologiczne problemy ochrony środowiska*, red. Adam Ginsbert-Gebert, 9-20. Wrocław: Zakład Narodowy im. Ossolińskich.

Przeździecki, Zdzisław. 1980. *Biologiczne skutki chemizacji środowiska*. Warszawa: Wydawnictwo Naukowe PWN.

Radwańska-Paryska, Zofia. 1963. „Prof. Bolesław Hryniewiecki - człowiek i uczony." *Wiadomości Botaniczne* 3-4: 173-18.

Rajca M. 1987. *Walery Goetel jako sozolog*. Warsaw (Master's thesis at the Department of Human Ecology and Bioethics at the ATK).

Rosiński, Franciszek. 1988. „Odpowiedzialność moralna za ochronę środowiska." *Chrześcijanin a Współczesność* 5: 18-27.

Rosnerowa, Hanna. 1975. „Współczesne spory o pojęcie prawdy i jej ekspresję." Znak 27: 1243 -1261.

Sadowski, Walim. 1978. *Podstawy ogólnej teorii systemów. Analiza logiczno-metodologiczna*. Warszawa: Wydawnictwo Naukowe PWN.

Siek, Stanisław. 1982. *Higiena psychiczna i autopsychoterapia*. Warszawa: ATK.

Siek, Stanisław. 1986. *Struktura osobowości*. Warszawa: ATK.

Skawiński, Paweł. 1988. „Stanisław Sokołowski (1865-1942)." W *Twórcy* i *działacze ochony przyrody w Polsce*, red. Stanisław Drewniak. Warszawa: Liga Ochrony Przyrody.

Skinder, Natalia W. 1991. *Chemia a ochrona środowiska*. Warszawa: Wydawnictwa Szkolne i Pedagogiczne.

Skoczylas, Józef J. 1986. *Cywilnoprawne środki ochrony środowiska*. Warszawa: Akademia Spraw Wewnętrznych.

Skórny, Zbigniew. 1966. *Współczesne metody badań psychologicznych*. Wrocław: Zakład Narodowy im. Ossolińskich.

Sommer, Jerzy (red.). 1987. *Prawo człowieka do środowiska naturalnego*. Wrocław: Zakład Narodowy im. Ossolińskich.

Sommer, Jerzy (red.). 1990a. *Skuteczność prawa ochrony środowiska w warunkach reformy gospodarczej*. Wrocław: Zakład Narodowy im. Ossolińskich.

Sommer, Jerzy. 1990b. „System prawa a problemy środowiska i zdrowia." W *Człowiek środowisko zdrowie*, red. Jan Kopczyński, i Andrzej Siciński, 365-376. Wrocław: Zakład Narodowy im. Ossolińskich.

Stępień, Antoni B. 1973. „Istnienie (czegoś) a pojęcie i sąd." *Studia Philospohiae Christianae* 1: 235-261.

Stępień, Antoni B. 1983. „Wartości poznawcze w ujęciu współczesnej filozofii tomistycznej." *Studia Filozoficzne* 1-2: 49-83.

Stępień, J. (red.) 1974. *Zadania nauki w dziedzinie racjonalnego kształtowania środowiska człowieka*. Wrocław: Zakład Narodowy im. Ossolińkich.

Stromenger, Zuzanna. 1988. *Przystosowani pożyją dłużej*. Katowice: Śląsk.

Such, Jan. 1975. *Czy istnieje Esperimentum crucis? Problemy sprawdzania praw i teorii naukowych: studium metodologiczne.* Warszawa: Wydawnictwo Naukowe PWN.

Such, Jan. 1985, „Eksperyment." W *Filozofia a nauka*, red. Maria Iżewska, 120-131. Wrocław: Zakład Narodowy im. Ossolińskich.

Szafer, Władyslaw. 1973. „Dzieje ochrony przyrody w Polsce i w innych krajach." W *Ochrona przyrodniczego środowiska człowieka*, red. Władysław Szafer, 13-15. Warszawa: Wydawnictwo Naukowe PWN.

Szafrański, Adam L. 1988. „Ochrona środowiska w świetle teologii." *Chrześcijanin a Współczesność* 5: 4-10.

Szaynoka, Andrzej (red.). 1990. *Fizykochemiczna analiza zanieczyszczeń powietrza*. Wrocław: Politechnika Wrocławska.

Szczęsny, Tadeusz. 1973. „Międzynarodowe problemy ochrony przyrodniczego środowiska człowieka." W *Ochrona przyrodniczego środowiska człowieka*, red. Władysław Szafer, 107-114. Warszawa: Wydawnictwo Naukowe PWN.

Szyrej, Małgorzata. 1991. „Edukacja środowiskowa prowadzona w Wyższej Szkole Pedagogicznej w Częstochowie." W *III Międzynarodowe Seminarium Ekologiczne, Pokrzywna 1991*, 1-14. Opole: Wojewódzki Ośrodek Informacji Naukowej, Technicznej i Ekonomicznej Urzędu Wojewódzkiego.

Ślaga, Szczepan W. 1982. „Ontologia systemowa a filozofia przyrody." *Roczniki Filozoficzne* 3: 119-128.

Ślaga, Szczepan W. 1987. "U podstaw biosystemogenezy." W *W poszukiwaniu prawdy. Pamięci profesora Kazimierza Kłósaka*, red. Mieczysław Lubański, i Szczepan W. Ślaga, 174-201. Warszawa: ATK.

Ślaga, Szczepan W., i Mieczysław Lubański. 1979. „Wspólnota kościelna w aspekcie systemowym." W *Człowiek we wspólnocie Kościoła*, red. Lucjan Balter, 117-152. Warszawa: ATK.

Ślaga, Szczepan W., i Mieczysław Lubański. 1983. "The System Approach to Scientific Research." *Philosophical Inquiry* 1: 1-13.

Ślipko, Tadeusz. 1988. *Granice życia. Dylematy współczesnej bioetyki.* Warszawa: UKSW.

Tang, Edmond. 1990. „La religion a-t-elle quelguq chose a voir avec l'ecologie?" *Pro Mundi Vita* 13:19.

Targowski, Andrzej. 1980. *Informatyka. Modele systemów i rozwoju*. Warszawa: Państwowe Wydawnictwa Ekonomiczne.

Tomaszewski, Edward. 1979. „Rola obserwacji satelitarnych w ochronie i kształtowaniu środowiska." W *Człowiek i środowisko*, red. Włodzimierz Michajłow, 161-188. Wrocław: Zakład Narodowy im. Ossolińskich.

Trocquer, Rene le. 1969. *Kim jestem ja - człowiek? Zarys antropologii chrześcijańskiej*. Paris: Editions du dialogue.

Twardowski, Kazimierz. 1965. „O tak zwanych prawdach względnych." W *Wybrane pisma filozoficzne*, red. Kazimierz Twardowski, 315-336. Warszawa: Wydawnictwo Naukowe PWN.

Tyburski, Włodzimierz (red.). 1995. *Człowiek i środowisko - dyscypliny humanistyczne i ekologia*. Toruń: Courier.exe.

Tyburski, Włodzimierz (red.). 1996. *Ekofilozofia i bioetyka VI Polski Zjazd Filozoficzny*. Toruń: TOP Kurier.

Tyburski, Włodzimierz (red.). 1998. *Etyka środowiskowa - Teoretyczne i praktyczne implikacje*. Toruń: TOP Kurier.

Tyczka, Sabina, i Irena Ponikowska. 1983. *Człowiek, pogoda, klima*t. Warszawa: PZWL.

U THANT, Sithu. 1971. "Człowiek i jego środowisko." W *Dajcie szansę Ziemi*, red. I. Zieleński, 233-282. Warszawa: Książka i Wiedza.

Wciórka, Ludwik. 1976. *Ewolucja i stworzenie. Próba reinterpretacji ewolucji i stworzenia na podstawie romistycznej koncepcji partycypacji*. Poznań: Księgarnia Św. Wojciecha.

Winnicki, Tomasz. 1985. „Ekonomiczne problemy ochrony środowiska." W *Podstawy ochrony środowiska*, red. Bohdan Głowiak, Edward Kempa, i Tomasz Winnicki, 323-336. Warszawa: Wydawnictwo Naukowe PWN.

Winogradow, Borys W. 1983. *Satelitarne metody badania środowiska przyrodniczego*. Warszawa: Wydawnictwo Naukowe PWN.

Witkowska, Anita (red.). 1973. *Biosfera*. Warszawa: Wydawnictwo Naukowe PWN.

Wodziczko, Adam. 1935. „Kierunki współczesnej ochrony przyrody." *Przyroda i Technika* 4: 145-148.

Wodziczko, Adam. 1946. „Ochrona przyrody jako nauka i jej potrzeby." *Chrońmy Przyrodę Ojczystą* 1-2: 8-15.

Wojciechowski, Tadeusz. 1969. „Transcendencja duszy ludzkiej w ujęciu Piotra Teilharda de Chardin." *Studia Philosophiae Christianae* 1: 259-262.

Wojciechowski, Tadeusz. 1972. „Problem ewolucyjnej genezy duszy ludzkiej." *Roczniki Filozoficzne* 3: 149-166.

Wojciechowski, Tadeusz. 1974. „Teilhardowska koncepcja transcendencji duszy ludzkiej i jej wpływ na chrześcijańską antropologię filozoficzną." Śląskie Studia Historyczno-Teologiczne 7: 215-244.

Wojciechowski, Tadeusz. 1985. *Wybrane zagadnienia z antropologii filozoficznej*. Kraków: Polskie Towarzystwo Teologiczne.

Wolański, Napoleon. 1989. „Populacja ludzka jako bioinduktor stanu środowiska (środowiskowe uwarunkowania rozwoju biologicznego ludności Polski)." *Nauka Polska* 1: 31-56.

Woleński, Jan. 1990. „O semantycznej definicji prawdy." *Studia Filozoficzne* 1: 67-120.

Woronowski, Franciszek. 1990. *Ewangelizacja porządku doczesnego*. Łomża: Wyższe Seminarium Duchowne.

Woronowski, Franciszek. 1991. *Ojczyzna oczekiwana*, Łomża: Wyższe Seminarium Duchowne.

Wójcicki, Ryszard. 1982. *Wykłady z metodologii nauk*. Warszawa: Wydawnictwo Naukowe PWN.

Wójcik, Zofia. 1986. *By ziemia pozostawała piękna i zasobna*. Warszawa: Wydawnictwa Szkolne i Pedagogiczne.

Zabierowski, Kazimierz. 1973. „Ekonomiczne podstawy ochrony przyrody." W *Ochrona przyrodniczego środowiska człowieka*, red. Władysław Szafer, 363-386. Warszawa: Wydawnictwo Naukowe PWN.

Zabierowski, Mirosław. 1988. „Zasada antropiczna w fizyce współczesnej." *Z Zagadnień Filozofii Przyrodoznawstwa i Filozofii Przyrody* 10: 197-208.

Zabierowski, Mirosław. 1990. *Status obserwatora w fizyce współczesnej*. Wrocław: Wydawnictwo Politechniki Wrocławskiej.

Zajączkowski, M. 1939. "Życiorysy i wspomnienia." *Ziemia* 2: 45-76.

Zawadzka, A. 1986. *Polscy botanicy w służbie ochrony przyrody.* Warsaw (Master's thesis at the Department of Human Ecology and Bioethics at the ATK).

Zdrójkowska, Adriana (red.). 1986. *Człowiek i przyroda*. Warszawa: Książka i Wiedza.

Ziembiński, Zygmunt. 1977. *Logika praktyczna*. Warszawa.

Zięba, Stanisław, i Zbigniew Wróblewski. 2000. *Ekologia a transformacje cywilizacyjne na przełomie wieków*. Lublin: KUL.

Życiński, Józef. 1986. „W poszukiwaniu filozoficznej unifikacji rozwijającej klasyczną tezę o Bożej immanencji w przyrodzie." *Przegląd Powszechny* 11: 169-179.

Życiński, Józef. 1987. „Zasada antropiczna a teologiczne interpretacje przyrody." *Studia Philosophiae Christianae* 2: 169-186.