Method of Construction Projects’ Classification for Habitat Assessment in Poland and the Problem of Choosing Materials Solutions

Jolanta Harasymiuk * and Elżbieta Szafranko

Institute of Geodesy and Civil Engineering, University of Warmia and Mazury in Olsztyn, Faculty of Geoengineering, 10-719 Olsztyn, Poland; elasz@uwm.edu.pl
* Correspondence: jolanta.harasymiuk@uwm.edu.pl

Abstract: The planning stage plays a key role in the success of each construction project. It also pertains to projects implemented in the Natura 2000 areas that cover ca. 18% of the total land area in the EU. Permission for the realization of such a project is issued after an analysis of its environmental impact on the Natura 2000 area. An important part of the analysis undertaken as part of a habitat assessment should be the evaluation of proposed material solutions. The research has revealed that habitat assessments in Poland do not fulfill this postulation. The decision-making process is based on the legal qualification criteria, and the fundamental importance in it has a precautionary principle. Practical realization of this principle demonstrates, however, shortcomings in its methodology. The article presents the results of two research stages. In the first stage, the documentation of 292 construction projects was examined in order to prepare the principal components of a checklist. They are correlated to the legal qualification criteria. However, they are more precise and systematic. In the second stage of the research, a survey of 47 experts was performed, and the result of the research is an innovative module of the checklist for qualification of construction projects to the habitat assessment, including questions on materials solutions. The research has proved that introduction of this proposal to the checklist may improve the quality of habitat assessments, increase their trustworthiness and ensure full exploitation of the possibilities which are given by the use of uniform research methods.

Keywords: construction project; Natura 2000; habitat assessment; environmental decision problems; precautionary principle; materials solutions; checklist; Poland

1. Introduction

The planning stage has a key influence on the success of each construction project. At this stage, various concepts and methods can be considered which have an influence on the preparation, realization, and exploitation of a building object. It is at this stage when the introduction of the principle of sustainable growth profits during the entire time of object exploitation [1]. The possibility of adaptation of the concept of sustainable growth in the building trade has been verified in numerous research studies and presented on many examples of case studies carried out all over the world [2–5]. However, a small number of researchers present in their publications the topic of the use of the sustainable growth concept in the process of planning construction projects in the areas being a part of the Natura 2000 network. According to the legal regulations of the EU, Natura 2000 is a coherent ecological network whose establishment serves the realization of the strategic goal, which is intercepting the decrease in biodiversity in Europe. In the earlier research studies, the emphasis was placed on: implementation problems [6,7], the identification of limitations for investment in the Natura 2000 areas [8–10], the idiosyncrasy of the assessment procedure [11,12], and methodical shortcomings of the assessment [13]. The existence of investment barriers in the Natura 2000 areas in Poland was proved among
others by the research [8], which showed a negative impact of the Natura 2000 areas on the local economy of a chosen province. As many as 35% of examined entrepreneurs claimed that the influence of such areas on the possibility of their business development was definitely negative or negative (38% of respondents’ answers pertained to a neutral influence). A contradictory thesis was offered in the publication [9].

In the framework of the undertaken research, the efforts were made to establish the way of understanding the role of the Natura 2000 areas at the level of local tourist activities of Sudety communes in the light of their planning and strategic documents. Although 80% of the examined communes considered the Natura 2000 areas as a significant element of their socio-economic development, these issues were of little interest to the investors. In the study [14], the general usefulness of the qualitative methods in environmental assessments was demonstrated. The notion of an assessment method should be understood as a set of principles or rules determining activities that should be applied in a research procedure. Table 1 presents a summary of the most important literature items concerning environmental assessments methods. The LCA method, which refers to the sustainable use of natural resources, plays an important role in it.

Table 1. Leading environmental assessment methods in previous studies.

| No. | Authors | Title | Journal/Year/No. |
|-----|---------|-------|-----------------|
| 1   | Boix Rodríguez, N., Formentini, G., Favi, C., Marconi, M. [15] | Engineering design process of face masks based on circularity and Life Cycle Assessment in the constraint of the COVID-19 pandemic | Sustainability, 2021, 13(9), 4948 |
| 2   | Curley E.A.M., Valyrakis M., Thomas R., Adams C.E., Stephen, A. [16] | Smart sensors to predict entrainment of freshwater mussels: A new tool in freshwater habitat assessment | Science of The Total Environment, 2021, 787, 147586 |
| 3   | Dias A.B., Pacheco J.N., Silvestre J.D., Martins I.M., de Brito J. [17] | Environmental and Economic Life Cycle Assessment of Recycled Coarse Aggregates: A Portuguese Case Study | Materials, 2021, 14(18), 5452 |
| 4   | Ferronato, N., Guisbert Lizarazu, G.E., Gorritty Portillo, M.A., Moreesco, L., Conti, F., Torretta, V. [18] | Environmental assessment of construction and demolition waste recycling in Bolivia: Focus on transportation distances and selective collection rates | Waste Management & Research, 2021, 0734242X211029170 |
| 5   | Martinez-Muñoz D., Marti J.V., Yepes V. [19] | Comparative Life Cycle Analysis of Concrete and Composite Bridges Varying Steel Recycling Ratio | Materials, 2021, 14(15), 4218 |
| 6   | Raza, F., Alshameri, B., Jamil, S.M. [20] | Engineering aspect of sustainability assessment for geotechnical projects | Environment, Development and Sustainability, 2021, 23(4), 6359-6394 |
| 7   | Rider T.R., Van Bakergem M. [21] | Building for Well-Being. Exploring Health-Focused Rating Systems for Design and Construction Professionals | Book, Imprint Routledge, New York 2021 |
| 8   | Thérivel R., González A. [22] | Strategic environmental assessment effectiveness | In Handbook on Strategic Environmental Assessment. Edward Elgar Publishing, 2021 |
| 9   | Vanova R., Vlcko M., Stefko J. [23] | Life Cycle Impact Assessment of Load-Bearing Straw Bale Residential Building | Materials, 2021, 14(11), 3064 |
| 10  | Adedoyin, F.F., Alola, A.A., Bekun, F.V. [24] | An assessment of environmental sustainability corridor: the role of economic expansion and research and development in EU countries | Science of the total environment, 2020, 713, 136726 |
Table 1. Cont.

| No. | Authors | Title | Journal/Year/No. |
|-----|---------|-------|------------------|
| 11  | Chen Z.S., Zhang X., Pedrycz W., Wang X.J., Skibniewski, M.J. [25] | Bid evaluation in civil construction under uncertainty: A two-stage LSP-ELECTRE III-based approach | Engineering Applications of Artificial Intelligence, 2020, 94, 103835 |
| 12  | Gomez M., Peisino L.E., Kreiker J., Gaggino R., Cappelletti A., Martin S.E., Uberman P.M., Positiere M., Raggiotti B.B. [26] | Stabilization of hazardous compounds from WEEE plastic: Development of a novel core-shell recycled plastic aggregate for use in building materials | Construction and Building Materials, 2020, 230, 116977 |
| 13  | Henckel, L., Bradter, U., Jönsson, M., Isaac, N.J., Snäll, T. [27] | Assessing the usefulness of citizen science data for habitat suitability modeling: Opportunistic reporting versus sampling based on a systematic protocol | Diversity and Distributions, 2020, 26(10), 1276-1290 |
| 14  | Kvočka D., Lešek A., Knez F., Ducman V., Panizza M., Tsoutsis C., Bernardi A. [28] | Life Cycle Assessment of Prefabricated Geopolymeric Façade Cladding Panels Made from Large Fractions of Recycled Construction and Demolition Waste | Materials, 2020, 13(18), 3931 |
| 15  | Liu, J., Liu, Y., Wang, X. [29] | An environmental assessment model of construction and demolition waste based on system dynamics: a case study in Guangzhou | Environmental Science and Pollution Research, 2020, 27(30), 37237-37259 |
| 16  | Lu W., Tam V.W., Chen H., Du, L. [30] | A holistic review of research on carbon emissions of green building construction industry | Engineering, Construction and Architectural Management, 2020, 27, 5, 1065-1092 |
| 17  | Ma B., Dong F., Peng W.Q., Liu X.B., Huang, A.P., Zhang, X.H., Liu, J.Z. [31] | Evaluation of impact of spur dike designs on enhancement of aquatic habitats in urban streams using 2D habitat numerical simulations | Global Ecology and Conservation, 2020, 2, e01288 |
| 18  | Minunno R., O’Grady T., Morrison, G.M., Gruner, R.L. [32] | Exploring environmental benefits of reuse and recycle practices: A circular economy case study of a modular building | Resources, Conservation and Recycling, 2020, 160, 104855 |
| 19  | North, A., Barker, P. [33] | Flora and Fauna Habitat Assessment, Including Collision Risk | NorthBarker, Campbell Street Hobart TAS 7000, 2020 |
| 20  | O’Shaughnessy, K.A., Hawkins, S.J., Evans, A.J., Hanley, M.E., Lunt, P., Thompson, R.C., Simon P.H., Moore P.J., Iglesias G., Simmonds D., Ducke J., Firth, L.B. [34] | Design catalog for eco-engineering of coastal artificial structures: a multifunctional approach for stakeholders and end-users | Urban Ecosystems, 2020, 23(2), 431-443 |
| 21  | Laiblová L., Pešta J., Kumar A., Hájek P., Fiala C., Vlach T., Kočí V. [35] | Environmental Impact of Textile Reinforced Concrete Facades Compared to Conventional Solutions—LCA Case Study | Materials, 2019, 12(19), 3194 |
| 22  | Awadh O. [36] | Sustainability and green building rating systems: LEED, BREEAM, GSAS and Estidama critical analysis | Journal of Building Engineering, 2017, 11, 25-29 |
| 23  | Hirzel A.H., Le Lay G. [37] | Habitat suitability modeling and niche theory | Journal of applied ecology, 2008, 45.5, 1372-1381 |

A habitat assessment (HA) is a different type of environmental assessment than an environmental impact assessment (EIA) for projects [13,38]. For example, the catalog of undertakings that require HA is open. As a consequence, this kind of assessment should be carried out in the case of each undertaking, which can potentially be harmful to a Natura
2000 area. A qualification process of construction projects for HA should be conducted in the most objective way and comparable for different regions. However, this is not a common practice in Poland. One of the reasons for this situation is the lack of a coherent set of criteria. The main principle applied in the qualification for both EIA and HA is the precautionary principle [39–43]. Practical realization of this principle demonstrates, however, shortcomings in its methodology [43]. Moreover, this is also not a good practice to use checklists as a tool to check the quality and completeness of the data. Even if checklists in HA are used, the issue of technological and materials solutions is not included.

These problems inspired the Authors of this study to start research work. Having made a critical analysis of construction projects’ qualification to HA and after carrying out an attempt to work out guidelines for improvement of this process, criteria were proposed on the use of environment-friendly building materials. These criteria were included as questions in a checklist, and their legitimacy was assessed by means of an environmental interview with the experts.

2. Materials and Methods

The research was carried out in stages. In the first stage, the method of analysis of the literature was used as well as the method of analysis of secondary data. The articles pertaining to the analyzed issues were found in the databases Web of Science Core Collection and Google Scholar. The analysis focused on articles published in the years 2000–2022. We used the following keywords: “LCA assessment”, “LCA materials”, and “habitat assessment”. The secondary data were obtained from the documentation submitted along with investment applications and the documentation comprising a summary of HA procedure. The preliminary research comprised the overview of 292 copies of applications for development conditions and decisions on the necessity of carrying out HA for construction projects. The adopted method of analysis led to extraction of projects which required HA and, therefore, in-depth overview. The diagram of the research process is shown in Figure 1. Figure 2 shows the percentage decisions of appropriate organs in Poland stating the obligation (or lack of obligation) of making HA. Figure 3 presents the kind of construction projects requiring such an assessment, and Figure 4—the Natura 2000 areas involved in the decision process.

In the second stage of the research, the following tools were applied: the method of deepened interview, survey research, and the method of significance assessment based on experts’ opinions consisting in comparison of factors in pairs. After the preliminary deepened interview, the initial issues were established, requiring an explanation of planned material solutions. In the further step, a survey was used, which required such a form of answer. It allowed comparing all the criteria in pairs and pointing out that were considered by the experts to be the most important. The research allowed establishing a ranking list of questions for preparation of an expanded checklist.

The research performed in its first stage led to establishing a sample of a checklist that provides an ordered approach to qualification of construction projects with regard to a significant impact on Natura 2000 areas. The second stage led to establishing a checklist expanded by the materials and technological issues. Figure 4 presents the scheme of the research.

The major objective of this study is to develop a project of a checklist in which materials solutions will gain their due rank in the process of qualification of construction projects for HA. This checklist can be used by main project participants to understand and improve a qualification process.
Figure 1. The diagram of the research process.

Figure 2. Share% of RDoEPIo's decisions concerning HA reasonableness.
The major objective of this study is to develop a project of a checklist in which materials solutions will gain their due rank in the process of qualification of construction research. The idea of the Natura 2000 network was introduced in Europe in 1992. It is an ecological network that was to serve the strategic aim of environment protection, and, namely, to stop the extinction of animal and plant species, the disappearance of natural habitats, and the decrease in biodiversity in Europe. Delimitation of protected areas was defined in the Directive 92/43/EWG of the European Council on the protection of natural habitats and fauna and flora wildlife (habitat directive) and in the Directive 79/409/EWG of the Council on the protection of wild birds (birds directive). These directives are bidding by all the member states of the EU, which had to include their solutions in their legal systems. Depending upon a country, the total land area of the Natura 2000 system amounts from ca. 9% to almost 38% [44]. The network of Natura 2000 occupies almost 20% of the total land area in Poland, with the majority in rural areas. It consists of 845 areas with significance to the Union (habitat areas—future special areas of protected habitats) and 145 special pro-
tection areas of birds. According to the General Directorate for Environmental Protection (it is an expert institution responsible for nature protection and control of investment processes in Poland), in 2021, the total area of the Natura 2000 network will increase by 4221.59 ha. Functioning of it in Poland is regulated by the Parliamentary Act on environment protection (from 16 April 2004). This act obliged the supervision bodies of such areas (regional directorate for environmental protection, which they number the same figure as there are provinces in Poland) to prepare 10-year plans of protection tasks (PoPTs) for Natura 2000 areas. This document is passed by a regional director of environment protection (RDoEP) as a local legal act in the form of a decree after a prior acceptance of a director of the regional directorate of National Forests (if they encompass areas managed by National Forests). The scope of indispensable data to an accurate elaboration of PoPT is defined by law. An important element of such a document from the viewpoint of the analyzed subject is the guidelines for changes in the planning documents of communes (to limit and/or eliminate threats), necessary to maintain or re-create the condition of habitats and protected plant species, to protect which the Natura 2000 areas were designed. In the current legal state, the status of PoPTs is unclear [45]. The recommendations presented in them may or do not have to be introduced to planning documents undergoing changes, such as commune studies or local planning documents [45]. If any construction project is planned in a Natura 2000 area and at the same time it is inconsistent with the provisions of PoPT, the regional director for environmental protection should not give a positive opinion on it.

3.2. HA’s Specificity

In the Polish system of EIAs, the duty of making HA lies on appropriate organs (RDoEPs as the main bodies and district governors or commune heads, mayors as auxiliary bodies). According to the fundamental legal regulation pertaining to EIAs in Poland (Parliamentary act on access to information on the environment and its protection, the society contribution in environmental protection and impact assessments on the environment), HA should be understood as “an assessment of impact a undertaking on the environment limited to examination of impact of this undertaking on a Natura 2000 area”. Such a definition says very little about the essence of this assessment and of its scope. It is also much more general than a definition of EIA, which is encompassed in the same Parliamentary act. In accordance with the regulations, this assessment consists of:

• verification of a report on a construction project impact on the environment, obtaining opinions and agreements, which are required by the Parliamentary act;
• ensuring the possibility of community’s participation in the proceedings”.

Actually, different definitions of HA are given. They emphasize a preventive character in this procedure, but they do not enable it to determine its substantive scope. HA, as well as EIA, is on the critical path determining the time of preparing the construction project to carry it out. However, it shows the essential differences in terms of the aim, range, methodology, subjects, or responsible clerks for their accomplishment [13,43]. HA is required in the case of different construction projects than those which may significantly influence the environment and which are not directly related to the protection of a Natura 2000 area or do not stem from this protection. Before issuing any investment decision (e.g., a building permit, a water-use permit, a decision of development condition), the authorized organ is obliged to consider whether a construction project can potentially have a significant influence on a Natura 2000 area. If it decides that there is a risk of such an influence, it imposes an obligation by way of a decision to submit to a locally appropriate RDoEP the information on a project. If RDoEP confirms the possibility of a significant negative impact, it imposes an obligation by way of a decision to carry out HA. The lack of uniform criteria causes an increased risk of making mistakes in the process of qualification, which is twofold. A construction project can significantly influence a Natura 2000 area and can be excluded from HA at the same time. In this case, an environment report will not be made, which as the only one can minutely analyze the impact of a construction project on
the integrity of a Natura 2000 area [39,43]. There is also a situation possible when a project with an insignificant impact on the Natura 2000 site may be subjected to HA in which the investor would be required to prepare a report, although, in practice, it would not provide essential and decisive content. Incorrectly conducted HA may lead to a situation in which the investor who implemented the project with a significant negative impact on a Natura 2000 area and caused either damage to the environment (in protected species or natural habitats) or a direct threat of damage will be liable for it. It is not important, in this case, whether he realized the project on the basis of an obtained environmental decision or on the basis of agreed conditions for the implementation of the project. The issue of qualifying construction projects for HA is not analyzed enough. The research conducted by the Authors fills this gap.

3.3. Qualification Process for HA in the North-Eastern Region of Poland

The region of north-eastern Poland has remained in the category of the least attractive for investment for years [46]. This position is, first of all, the consequences of long-term socio-economic processes. Despite the progress in expanding and modernization of the infrastructure of the national rank, the region is still characterized by inadequate transport access. The low attractiveness for investments of the region means that it stands little chance to draw large-scale investments. It can be enhanced by strengthening attractiveness for investment for activities related to unique resources and assets of this (protected and naturally valuable areas). In this region, partially or as their whole, there are 16 areas of special bird protection (covering 575.809 ha) and 43 areas of significance to the Union (covering 258.190 ha). In total, the areas of Natura 2000, including their shared parts, cover 664.990 ha, i.e., 27.6% of the region. The course of HA is supervised by the Regional Director of Environmental Protection in Olsztyn (RDoEPiO). It is a specialized organization for controlling investment processes in respect of environmental protection. Figure 2 shows what the RDoEPiO’s decisions were in the years of 2015–2018, confirming the obligation to make HA for construction projects that cannot significantly influence the environment (in Poland, so-called group III). They concerned different kinds of construction projects (cubature objects, land, and water engineering constructions, etc.) of different impact scales (single buildings or their complexes) as well as of different property status (private and public investments). In the category of investments subject to the HA obligation, the greatest number constituted SFRs (Figure 3). This fact confirms the trend of the increasing popularity of investment in the areas of high-level environmental protection, which has remained for several years [40,44]. Valuable, natural areas are enjoying growing popularity among individual investors who want to relax from the urban bustle.

The research shows that the requirement of HA was started in response to the fact of planning the construction of SFRs by investors in complexes of undeveloped land real estates away from the dense development of villages, in the distance from other agricultural settlements, and other developed technical infrastructure. In RDoEPiO’s opinion, such localization might cause disturbances in local ecosystems. Investments were planned in different areas, which are included in the Natura 2000 areas in the province of Warmia and Masuria (Figure 4). The majority of them pertained to special areas of birds protection. The biggest interest among investors was noted for the Pisz Forest PLB280008 (169,101.30 ha in the province of Warmia and Masuria). This area constitutes one of the most important nationwide retreats for bird predators and owls. Five rare bird species on the list of Polish animal Red Book nestle here, whereby for the white-tailed eagle it is the biggest, and for black kite, lesser spotted eagle and osprey—one of the main breeding retreats in the country. The special area of birds protection of the Dobskie Lake was also investment attractive in the analyzed period of time. It is an important place for crane concentration (ca. 3000 birds), a place for migratory aquatic and wading birds (over 200 of common goldeneyes and 500 of bean and graylag geese), as well as a place of predators nesting (among others of lesser spotted eagle). Within the retreat, there are 21 birds species from Annex I of the Birds Directive and seven other valuable and endangered birds species.
3.4. The Precautionary Principle in European and Polish Law

The precautionary principle is a commonly accepted in Europe approach to environmental protection [42]. It is used both in the acts of primary law and of secondary law. It stems from art. 191 Section 2 of the Treaty from 13 December 2007 on the functioning of the European Union (TFUE), i.e., from the previous art. 174 of the Treaty of establishing the European Community concluded in Rome on 25 March 1957. A high level of environmental protection was set as a goal, based “on the principle of caution and on the principle of prevention”[47]. Identical content is presented in art. III-233 of the Treaty establishing the European Constitution. Although the term “precautionary principle” is not applied in these regulations, it is acceptable to talk about a precautionary principle rather than simply a caution principle. The precautionary principle in the law of the EU focuses on the prevention of a potential negative impact on the environment.

It is also confirmed by the research of [43]. In this sense, the principle serves more conservation of the environment (i.e., upkeeping of the present condition) than an active shaping of the environment and restoring its state. These are characteristic measures for the policy of environmental protection led by the EU and the habitat directive, which were implemented in the Polish legal system. The treaties do not contain a definition of the precautionary principle. Therefore, its content was explained by the Court of Justice of the European Union (CJEU), especially in the cases which may be subject to the impact assessment. An example of that can be a verdict of the CJEU in the case C-127/0219 [48], pertaining to a catch of cockles in the area of special protection. The CJEU stated that “a permission for the plan in question or an undertaking may be issued on the condition that appropriate domestic authorities will be certain that this plan or undertaking will have no negative impact on the terrain”. According to the further text of the judgment, “It takes place when from the scientific point of view there are no rational doubts as for a lack of occurrence of such effects”, which is called a state of “scientific certainty”. The precautionary principle in relation to the network of Natura 2000 is expressed by art. 6 of the habitat directive and its commentary given by the CJEU.

3.5. HA’s Analysis from the Viewpoint of the Precautionary Principle

The precautionary principle has been present in the Polish legal system for several years. It is considered as one of the basic principles of the environmental protection law. It stems from its inclusion in the Parliamentary act of environmental protection law (from 27 April 2001), being a fundamental Parliamentary act for the Polish law of environmental protection. In the doctrine, there are present opinions that consider the precautionary principle only as a legal rule and not a legal principle since it does not fulfill all the essential requirements of the definition of legal principle (a lack of substantiality.) Not deciding whether these premises are legitimate, we treated the precautionary principle in our study as a legal principle because of its important meaning in the legal system of environmental protection. This principle is often related to the prevention principle, as its amplification obliges the prevention of any negative impact on the environment. In turn, foresight makes us take preventive actions also when a negative impact may occur only potentially. The precautionary principle obliges everyone who plans an activity whose negative impact is not fully recognized (because of insufficient knowledge, the impossibility of making an analysis, difference of opinions, among them of experts’ viewpoints), thus being guided by foresight to undertake any possible preventive measures. In this sense, the precautionary principle corresponds to the concept of sustainable development. Building construction using sustainable building materials fits in with this concept [49,50]. Therefore, there are no obstacles to taking these issues into account in the process of qualification of construction projects for HA.

3.6. Practice of Applying of Precautionary Principle in HA

The research shows that the decisions of RDoEPIO on the requirement of HA for construction projects in as many as 97.5% of cases adduced to the precautionary princi-
ple. The principle was different from its content as implied by the Parliamentary Act of 27 April 2001 on environmental law, but it was unanimous with the verdict of the CJEU. The arguments of RDoEPiO usually were based on the judgment of the CJEU, emphasizing the requirement to become certain that there will be no negative impact on the environment or the protected subject. RDoEPiO based its decisions on the data from the past several years (e.g., on the results of the natural inventory in the forests of the Regional Directorate of State Forests in Olsztyn from the years of 2006–2008) and circumstances undocumented in detail. The reference to the precautionary principle only in 20% of cases went hand in hand with the necessity of detailed analysis of cumulation of an impact of the construction project or existing building objects. Till the end of 2017, the situation might result from the legal obligation to view accumulated impacts in environmental reports prepared by investors [40]. This issue has a fundamental significance—while the level of impact of individual investments, not considered in a broader context, can be acceptable, the total of impacts from many sources may put significant pressure on the environment. In 90% of the cases, the investors were asked to prepare a general description of an analysis of cumulative impacts (apart from the short- and long-term impacts) but without reference to a specific localization. The basic method used in an analysis of cumulative impacts was the descriptive method. In order to obtain the information on completed and planned investments that may potentially significantly influence the environment, localized in the neighborhood of planned investments, a submission was made to provide such information to an appropriate office of a town or commune. The investors were requested to prepare an analysis. Only in 50% of the cases, RDoEPiO’s opinions were supported by an on-site verification, which provides a full view of environmental impacts. Consideration for accumulated investment impacts on the environment has been required in the process of environmental impact assessments in the USA as early as the end of the 1970s. In Poland, such a requirement was introduced in 2017. In 30% of the cases, a reference to the precautionary principle by RDoEPiO was excessively cautious because of the guidelines of PoPT, which formulated the need of backing away any development in order to reduce the limitations of threats for the analyzed areas of Natura 2000. This proves the need for complement to the precautionary principle as a basis for issuing decisions on the requirement of HA with the principle of sustainable construction. The precautionary principle as viewed by The Environment Protection Act does not oppose socio-economic development. It requires being cautious in pursuing this development, consisting in preventing the above-standard impact of investment on the environment. This, in turn, goes well with the maintenance of an appropriate state of the environment and the natural processes issuing from the principle of sustainable growth.

4. Course of the Research—Framework of Checklist for HA

In response to the scarcity of the tools used in the qualification of construction projects to HA, the template of a checklist was presented in the article. This checklist can be used to assess the quality of obtained data and to verify the completeness of a qualification process. Defining components of a checklist has an enormous significance in supporting an environmental decision pertaining to the necessity of HA or to its lack. Table 2 presents the three basic components of the checklist: construction project’s characteristics (CPC-A), construction project’s localization (CPL-B), and construction project’s impact (CPI-C). All of them are related to the legal qualification criteria, but they are more systematic and precise. Moreover, the first of the listed components includes a module of questions concerning materials solutions. Environmentally-friendly materials need to be promoted. This is especially true in the early phases of investment processes where the choice of materials is made. Environmentally-friendly materials are still poorly known and not much popularised, especially in Poland. One possible reason for this situation is that in the 21st century, there are efforts made to employ advanced building technologies while the potential of simple ones is not seen [51,52].
Table 2. Template of the checklist for construction projects qualification to HA.

| Category                                                                 | Description                                                                                     |
|---------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|
| **A. Construction Project’s Characteristics**                              |                                                                                                |
| CPC-A                                                                     |                                                                                                |
| A.1 Description of a project                                              | Name and address of a project. Identification of a building object/objects constituting a project from the viewpoint of building and environmental regulations. |
| A.2 Scale of a project                                                     | Description of basic technical parameters of the building object and of the accompanied object. Identification of projected scale of emissions resulting from project operations. |
| A.3 Materials solutions                                                    | Characteristics of building materials in terms of their availability, durability, environmental friendliness and proper selection according to the principle of “performance concept”. |
| **B. Construction project’s localisation**                                |                                                                                                |
| CPL-B                                                                     |                                                                                                |
| B.1 Legal basis of localisation                                           | Characteristics of regulations and localization procedure appropriate for a project.           |
| B.2 Localisation of a project in the space                                | Information about the plots’ registration numbers and detailed localization as well as the closed project surroundings. |
| B.3 Localization of a project in the environment                          | Detailed information on the distance of a project from protected areas and species. Description |
| **C. Construction project’s impact**                                      |                                                                                                |
| CPI-C                                                                     |                                                                                                |
| C.1 Project impact                                                        | Characteristics of predicted impacts of a project on the integrity and coherence of Natura 2000 sites (e.g., direct and indirect, intermediate and secondary, short-term and long-term, reversible, permanent and temporary) and foreseen possible negative results which can occur in different stages of project implementation. Identification of mentioned impacts on realistic alternatives of a project. |
| C.2 Cumulative impacts                                                    | Characteristics of cumulative interactions of a construction project along with an already existing and designed building objects. |

4.1. Materials Solutions Module

Based on the literature review [53–55] and an in-depth interview conducted with a group of experts related to the preparation of construction projects, a module of the checklist addressed to material solutions was prepared. The research has shown that these issues have not been considered during HA. Table 3 presents a set of questions of this module. They refer, for example, to: natural materials, material-saving technologies, and energy-saving installation solutions planned to be incorporated into building structures. All these issues relate to sustainable construction. The module of a checklist is to help its intentional users (environmental authorities) to recognize whether the investor intends to use environmentally friendly materials. Using the available information on the project, they should answer each question in the module by marking “X” where necessary. The module also provides space for detailed information required for further analysis and additional comments.
Table 3. Module of the checklist including questions about materials solutions.

| No | Control Question                                                                 | Yes | No | Non-Applicable | What Further Information Is Required | Remarks |
|----|----------------------------------------------------------------------------------|-----|----|----------------|-------------------------------------|---------|
|    | Materials issues                                                                 |     |    |                |                                     |         |
| Q1 | Do the accepted materials solutions of a building foresee the use of natural raw materials and unprocessed building materials? (e.g., wooden beams for construction of walls, natural stones for foundations, chimneys etc.) | ☐   | ☐  | ☐             |                                     |         |
| Q2 | Is it considered to apply reused materials e.g., bricks and wooden beams from demolished buildings? | ☐   | ☐  | ☐             |                                     |         |
| Q3 | Is it considered to use materials and raw materials from local producers in order to limit transport? | ☐   | ☐  | ☐             |                                     |         |
| Q4 | Is it foreseen to carry out an assessment of energy used to produce the materials? | ☐   | ☐  | ☐             |                                     |         |
| Q5 | Is it foreseen to use material-saving technologies?                               | ☐   | ☐  | ☐             |                                     |         |
| Q6 | Is it foreseen to apply energy-saving installation solutions in the building?     | ☐   | ☐  | ☐             |                                     |         |
| Q7 | Will the in-built prefabricated materials (in walls, floors, etc.) be adjusted to the building in the way that the on-site necessity for drilling, cutting or filing will be reduced? | ☐   | ☐  | ☐             |                                     |         |
| Q8 | Are the foreseen materials are fully recyclable (e.g., strawblocks, hempcreteblock)? | ☐   | ☐  | ☐             |                                     |         |

4.2. Assessment of Importance of Questions in Materials Solutions Module

The module of a checklist, including questions about material solutions, was tested and verified by special practicians. An in-depth interview was applied to obtain experts’ opinions. A checklist pertaining to building materials is a novelty and was prepared in accordance with the experts’ suggestions. The research leading to its establishment was completed in the period of 2017–2020, and 47 experts participated in it. The first step in making a list was enquiring, which enabled us to establish a list of problems that should be considered at the stage of qualification for HA. Then a survey was prepared to determine which of these problems are viewed by the experts as the most important. In Table 4, a fragment of the survey is presented, which shows the possibility of assessing the predominance of the C1 criterion over the others (from C2 to C8). In the table, we can see the scale of evaluation from −9 to 9. The scale was proposed on the basis of the theoretical assumptions of the AHP method, which also includes a comparison of the examined criteria in pairs. In accordance with the assumptions of this method [56–58], the score of nine signifies a very big superiority of the importance of the C1 criterion over a comparable criterion and one the same significance. The negative values mean that the C1 criterion is less important (the scale from −1 to −9 also signifies strength of predominance). In a similar way, each subsequent question/criterion is compared with the others.
As an outcome of the research, after arranging the results, an analysis of the proposed control questions was conducted, considered as evaluation criteria, and they were evaluated by comparing them in pairs. The comparison is made in a matrix, which is created by the values $a_{ij}$ equal to the score obtained in the survey and $1/a_{ij}$ constituting the reverse of this score. The diagonal of the matrix is composed of values equal to 1—a comparison of each criterion with itself. The matrix is shown in Formula (1).

$$A = \begin{bmatrix}
    a_{11} = \frac{1}{a_{12}}a_{13}a_{14} \\
    a_{21} = \frac{1}{a_{12}}a_{22} = 1 \\
    a_{31} = \frac{1}{a_{13}}a_{32} = \frac{1}{a_{23}}a_{33} = 1 \\
    a_{41} = \frac{1}{a_{14}}a_{42} = \frac{1}{a_{24}}a_{43} = \frac{1}{a_{34}}a_{44} = 1
\end{bmatrix} \quad (1)$$

The literature [59] gives the formulas of calculation in subsequent steps leading to reckoning the value of a priority indicator:

I. Calculation of the value of a normalized matrix (2):

$$w_{ij} = \frac{a_{ij}}{\sum_{i=1}^{n} a_{ij}} \quad (2)$$

where:

- $w_{ij}$—value of normalized matrix,
- $a_{ij}$—estimation of the score obtained in the survey,
- $1/a_{ij}$—reverse of score.

II. Determination of the value of the vector of sub-priorities (3):

$$w_j = \frac{1}{n} \sum_{i=1}^{n} w_{ij} \quad (3)$$

where (4):

$$w_j = \frac{1}{n} \sum_{i=1}^{n} w_{ij} \quad (4)$$

In order to verify whether the above-mentioned procedures have been corrected, we determine:

The matrix’s own maximum value (5):

$$\lambda = \frac{1}{w_j} \sum_{i=1}^{n} a_{ij}w_{i j_{\text{max}}} \quad (5)$$
Value of the consistency index (6):

\[ C.I. = \frac{\lambda_{\text{max}}}{n - 1} \]  

(6)

Consistency ratio (7):

\[ C.R. = \frac{C.I.}{R.I.} \]  

(7)

where: the C.R. should reach a value < 10%

R.I.—random index, the value of which depends on the “n” number of compared components [59].

4.3. Results

The results of the analysis made on the basis of the data obtained in the interviews and surveys are presented in Tables 5 and 6.

Table 5. Matrix of comparisons of the examined questions/criteria.

| Criteria | C1  | C2  | C3  | C4  | C5  | C6  | C7  | C8  | Total \(a_{ij}\) |
|----------|-----|-----|-----|-----|-----|-----|-----|-----|----------------|
| C1       | 1.00| 7.00| 1.00| 3.00| 3.00| 5.00| 5.00| 3.00| 28.00         |
| C2       | 0.14| 1.00| 0.20| 0.33| 1.00| 1.00| 1.00| 1.00| 7.68          |
| C3       | 1.00| 5.00| 1.00| 1.00| 5.00| 5.00| 3.00| 7.00| 28.00         |
| C4       | 0.33| 3.00| 1.00| 1.00| 3.00| 3.00| 5.00| 3.00| 19.33         |
| C5       | 0.33| 1.00| 0.20| 0.33| 1.00| 3.00| 1.00| 1.00| 7.87          |
| C6       | 0.20| 1.00| 0.20| 0.33| 0.33| 1.00| 0.33| 3.00| 6.40          |
| C7       | 0.20| 0.33| 0.33| 0.20| 1.00| 1.00| 1.00| 3.00| 9.07           |
| C8       | 0.33| 1.00| 0.14| 0.33| 1.00| 1.00| 0.33| 1.00| 4.48           |
| Sum \(a_{ij}\) | 3.54| 19.33| 4.08| 6.53| 15.33| 21.33| 18.67| 22.00| 110.82        |

Table 6. Matrix of preferences.

| Criteria | C1 | C2 | C3 | C4 | C5 | C6 | C7 | C8 | Total \(w_{ij}\) Lines | Priorities Vector (Total \(w_{ij}/n\)) | Priorities Vector \(w_{ij}\) in% |
|----------|----|----|----|----|----|----|----|----|------------------------|---------------------------------|-----------------------------|
| C1       | 0.28| 0.36| 0.25| 0.46| 0.20| 0.23| 0.27| 0.14| 2.18                   | 0.27                           | 27.29                        |
| C2       | 0.04| 0.05| 0.05| 0.07| 0.05| 0.16| 0.05| 0.05| 0.51                   | 0.06                           | 6.38                          |
| C3       | 0.28| 0.26| 0.25| 0.15| 0.33| 0.23| 0.16| 0.32| 1.98                   | 0.25                           | 24.73                        |
| C4       | 0.09| 0.16| 0.25| 0.15| 0.20| 0.14| 0.27| 0.14| 1.39                   | 0.17                           | 17.35                        |
| C5       | 0.09| 0.05| 0.05| 0.07| 0.14| 0.05| 0.05| 0.55| 0.55                   | 0.07                           | 6.88                          |
| C6       | 0.06| 0.05| 0.02| 0.02| 0.02| 0.14| 0.14| 0.58| 0.43                   | 0.05                           | 5.39                          |
| C7       | 0.06| 0.02| 0.08| 0.03| 0.14| 0.05| 0.14| 0.38| 0.38                   | 0.05                           | 4.70                          |
| C8       | 0.09| 0.05| 0.04| 0.05| 0.07| 0.02| 0.02| 1.00| 8.00                   | 1.00                           | 100.00                        |

The analysis of the assessment results by comparison in pairs allows determining a ranking of the importance of the proposed questions for the checklist pertaining to the issue of the materials used in the building trade.

The significance of the discussed problems in descending order is presented in the list below:

1. C1—Do the accepted material solutions foresee the use of natural raw materials and building materials, unprocessed?
2. C3—Is it considered to use materials from the local producers to reduce transport?
3. C4—Is it foreseen to carry out an assessment of the energy used for the production of applied materials?
4. C5—Is it foreseen to use a material-saving technology?
5. C2—Is it considered to apply reused materials?
6. C7—Will the in-built prefabricated materials (for walls, floors, etc.) be adjusted to a given building so that the on-site necessity to drill, cut, or file will be reduced?
7. C6—Is it foreseen to use energy-saving installation solutions in the building?
8. C8—Are the foreseen materials fully recyclable?

5. Discussion

As a result of the conducted analysis, it is possible to present a ranking list of questions. The use of natural, unprocessed raw materials ranked number one, and in second place, with a slightly lower score, is the use of local raw materials. In the surveys, the majority of respondents recognized these questions as important (65%) or very important (87%) (Figure 5).

![Distribution of answers in experts’ assessments.](image)

Figure 5. Distribution of answers in experts’ assessments.

Such a high assessment of the importance of these two questions results from the increasingly widely used assessments taking into account the entire life cycle of buildings and building materials. The use of unprocessed raw materials translates into a decreased energy consumption of the building by reducing the primary energy (production energy). A similar effect, leading to a reduction of the building’s energy balance, causes the use of local raw materials. Limiting the transport of materials, sometimes from distant regions, reduces the transport intensity and fuel consumption and also shortens the time needed to deliver materials to the construction site. In the literature on the subject [60,61], the authors emphasize that the analysis of energy-saving construction should not be limited to the period of operation but should be applied in a wider scope. A very helpful approach may be to combine sustainable materials with ecological building designs as described in the literature [62,63].

The third question in rank pertaining to the primary energy scored high (very important + important) by over 60% of the experts. Pointing to these issues as very important proves of an increase in awareness on sustainable building and of an approach in accordance with the philosophy of assessment of all the aspects of building object lifecycle.

Assessment of the importance of this question and placing it in the third position in the ranking confirms the experts’ approach to assessing the most important question about the use of raw materials and raw materials. These materials obviously have the lowest production energy and are highly rated in many environmental building analyses.
The questions related to energy—and material-saving technologies were to be found in the middle part of the ranking list. These are relatively popular issues in an attitude to planning and especially designing of building objects.

It is noteworthy that the use of recyclable and reusable materials in projects and the use of these materials were also quite far in the ranking—on the fifth position. Such an approach may issue from doubts, among other things, which appear increasingly often in the circle of engineers concerning the full usefulness of demolition materials to erect new objects. It pertains mainly to structural materials, which should fulfill certain strength requirements as well as chemical and mechanical.

The detailed breakdown of the answers given in the questionnaires may be interesting. In the case of the highest-rated question Q1, experts mostly agreed that it was an important or very important problem. Nobody considered it to be irrelevant, and only 3% of respondents considered it invalid. The distribution of answers in the case of the lowest-rated question Q7 looks different. It is noticeable that the responses are less agreeable, and although only 15% of the respondents considered this question very important, in the case of other assessments, the number of responses is at the level of 15–27%. Figure 6 shows the detailed structure of the answers.

![Distribution of answers for the question with the highest (Q1) and the lowest (Q7) assessed](image)

**Figure 6.** Distribution of answers for the question with the highest (Q1) and the lowest (Q7) assessed

Answers: 1—very important, 2—important, 3—medium, 4—not important, 5—irrelevant.

It may also be interesting to analyze the distribution of specific answers to the aforementioned questions. In order to illustrate this, the distribution of “very important” responses is shown in Figure 7. There is a clear predominance of Q1 indications as a very important problem, and the remaining percentages of responses are consistent with the preferences specified in previous studies.

The distribution of the “medium” response looks different (Figure 8). We can clearly see that they dominate the ratings of the points in the middle and final positions of the ranking list. There is also a greater dispersion and lower agreement of responses. The evaluation of the medium is rather neutral and, unlike the next analyzed evaluation, “irrelevant” does not translate much into the final evaluation.
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The next illustration in Figure 9 shows the distribution of “irrelevant” ratings. Here, as in the “very important” ratings, we can clearly see greater agreement in the experts’ ratings. The lowest rated questions Q7 and Q8, which were in the last positions in the ranking, received the most answers describing them as irrelevant.
The next illustration in Figure 9 shows the distribution of “irrelevant” ratings. Here, as in the “very important” ratings, we can clearly see greater agreement in the experts’ ratings. The lowest rated questions Q7 and Q8, which were in the last positions in the ranking, received the most answers describing them as irrelevant.

Figure 9. Distribution of “irrelevant” responses in the ratings of the 8 problems tested.

An in-depth analysis of the responses confirmed the generally known trend. In most cases, in the assessment of the most powerful answers, such as Very important or unimportant, they definitely relate to specific questions. Weaker responses, e.g., low importance, average responses, often spread evenly and do not have a large impact on the final scores.

In the discussed case, the analysis of very important responses may indicate which of the analyzed problems should be considered significant, however, taking into account the other assessments allows for a more accurate and precise determination of the ranking of the responses.

The subject of the presented study, concerning the extension of environmental assessments to the problem of the selection of materials and construction products in accordance with the principles of sustainable energy-efficient construction, allows for a conclusion that it is necessary to take these aspects into account. Most of the experts in the first phase of the research indicated that this problem exists, is important, and is not sufficiently covered in the source materials.

It is also difficult to find information and guidelines on this subject in the literature, which is an important premise for continuing the research started and presented by the authors in this article.

6. Conclusions

As a result of the first stage of research, it was established that:

1. In Poland, similarly to the other member states of the EU, there is a need for sustainable growth of legally protected areas. It should constitute a basis for appropriate environmental management to preserve naturally valuable areas and to enable local communities to invest.

2. In spite of the development of research on environmental impact assessments (EIAs), there is not still a synthetic tool for the qualification of construction projects for a habitat assessment (HA).

3. The precautionary principle used in the qualification process, although basically correct, should not be treated as a principle of total risk avoidance. The principle should be focused more on an in-depth analysis of all possible impacts of a construc-
4. The qualification process for HA based on the precautionary principle should be completed with the principle of sustainable growth and, more precisely, sustainable construction. One of the manifestations of such an approach may be the use of the checklist supplemented with a module on material solutions.

5. Defining the components of the checklist has an enormous significance in supporting environmental decisions pertaining to the necessity of making HA or to its lack. The three main components are: construction project’s characteristics (CPC-A), construction project’s localization (CPL-B), and construction project’s impact (CPI-C). As a part of the CPC-A component, the scale of a construction project should be analyzed. The research has shown that the scale of undertaken investments was least recognized both by the investors and the clerks.

6. Experts indicate that when applying the principle of sustainable construction, materials with low production energy and local raw materials should be used. The use of material and energy-saving technologies turns out to be equally important.

Implementation of these proposals for conduct and for Polish law may increase the quality of HAs and improve its trustworthiness to fully seize the opportunities which are offered by the use of a uniform research methodology as well as of analysis and comparison of results and data from different sources.

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