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Review

Taxonomy Regulation as a New Instrument for the Sustainable Management of the Forest Environment in Europe

Jarosław Brożek [1], Anna Kożuch [2], Marek Wieruszewski [3,*], Roman Jaszczak [4] and Krzysztof Adamowicz [1]

[1] Department of Forestry Economics and Technology, Faculty of Forestry and Wood Technology, Poznan University of Life Sciences, Wojska Polskiego 28, 60-637 Poznan, Poland; jarekbro4@wp.pl (J.B.); krzysztof.adamowicz@up.poznan.pl (K.A.)
[2] Department of Forest Resources Management, Faculty of Forestry, University of Agriculture in Krakow, Avenue 29–Listopada 46, 31-425 Krakow, Poland; anna.janusz@urk.edu.pl
[3] Department of Mechanical Wood Technology, Faculty of Forestry and Wood Technology, Poznan University of Life Sciences, 60-637 Poznan, Poland
[4] Department of Forest Management, Faculty of Forestry and Wood Technology, Poznan University of Life Sciences, 60-637 Poznan, Poland; romanj@up.poznan.pl
* Correspondence: marek.wieruszewski@up.poznan.pl

Abstract: Regulation (EU) 2020/852 of the European Parliament, also known as the Taxonomy Regulation, facilitates environmentally sustainable investments. It is part of the concept of the European Green Deal and a 'tool' for financial institutions, enterprises, and investors, facilitating the assessment of the environmental impact of a particular project. The Regulation contains the criteria an activity must meet to be considered environmentally sustainable. The role of the Taxonomy Regulation is to enable the flow of public and private capital towards ecological and sustainable activities. The document does not need to be implemented into the legal order of individual EU member-states, which results in its direct application. The main financial instruments enabling the achievement of the goals of the Taxonomy Regulation may be green bonds and other forms of capital raising by entrepreneurs and forest ownership structures. The assumption of the Regulation is to achieve the principles of sustainable environmental activity when spending funds obtained from private investors. It is an issue of key significance to identify the areas of management and financial accounting in the operational activities of forest enterprises that can be qualified for the Taxonomy Regulation. Forestry activities, including the processes mentioned therein, the objectives of the New EU Forest Strategy, and the LULUCF Regulation, are to play an essential role in reducing greenhouse gas emissions. The role of forestry in the supply chain in its broad sense is also considered. Forestry and forest management can receive capital for sustainable development due to the threat resulting from exclusions that strengthen the protective function of the forest (the protection of biodiversity). These processes will occur at the expense of production and numerous social functions.

Keywords: forestry; taxonomy; financing; CO_2 emission; sustainable development

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1. Introduction

Like the whole world, Europe is struggling with climate change and changes in the natural environment [1–4]. Over the last few centuries, the emission of anthropogenic greenhouse gases has increased by 30% [5,6]. The European Green Deal (Ref. [7] is a set of actions implemented in the European Union (EU) to reduce CO_2 emissions. Apart from sustainable economic and social development, environmental goals should be perceived as an element of the 2030 Agenda, which aims to create an optimal socioeconomic environment. The aim is to achieve net zero greenhouse gas emissions by 2050 [8]. By endorsing the Paris Agreement on climate change [9,10], the EU has committed to take action on climate change [11,12]. This is to ensure the compliance of financial flows with the desire to achieve low levels of greenhouse gas emissions and development that will not generate climate

change. The social and environmental context of sustainable development understood in this way is reflected in the Treaty on European Union [13] and the Treaty on the Functioning of the European Union [14]. The 'Fit for 55' climate package is an indirect instrument of the Green Deal to achieve climate neutrality in 2050 [15]. Other activities include the Biodiversity Strategy for 2030 in forest areas.

The EU proposal to amend the Land Use, Land-Use Change and Forestry (LULUCF) Regulation [11] includes an obligation to remove 310 million tonnes of CO_2 emissions by natural sinks by 2030 [16]. The LULUCF does not promote a radical reduction in CO_2 emissions. Its aim is to achieve balance between CO_2 emissions and sequestration by forested, deforested, arable lands and grasslands. The assumption of the LULUCF is to promote the development of forests and the rational management of forest resources, as they contribute to the protection of carbon resources, act as CO_2 absorbers, provide materials for construction, packaging, etc., as well as renewable energy, i.e., they are substitutes for other materials [17,18]. The EU forests and the forestry sector play an important role in the balance of greenhouse gases [19] and significantly affect the climate [20]. This fits into the concept of a multifunctional forest, related to the idea of lasting and sustainable development. Forest management activities will be strengthened by The New EU Forest Strategy for 2030 [21], which is one of the flagship initiatives of the European Green Deal. This document assigns the central and multifunctional role to forests, allowing for the role of forest administrators and the entire supply chain in striving to achieve a sustainable and climate-neutral economy.

According to the European Commission, it is necessary to invest 260 billion euros a year in order to achieve the goals and obligations resulting from the implementation of Green Deal initiatives [22]. This amount exceeds the financial capacity of the public sector [23]. Therefore, financial markets may play an important role here by redirecting private capital to sustainable investments supporting public spending [24] and ensuring the transparency of procedures [25]. The public procurement system plays an important role in the EU economy [26] and has various regulations [27–30]. In order to activate private capital, it is necessary to set the rules precisely defining an investment as 'green'. It is important to provide a system of incentives, as well as financial forms and instruments, stimulating the transfer of capital towards green investments. In consequence, on 18 June 2020, Regulation 2020/852 of the European Parliament and of the Council [31], also known as the Taxonomy Regulation, was issued. The document established a framework facilitating sustainable investments. The environmental objectives of the Taxonomy Regulation are the mitigation and adaptation to climate change, sustainable use and protection of water and marine resources, transition to a circular economy, control and prevention of pollution, and the protection and restoration of biodiversity and ecosystems [32]. The term taxonomy is used colloquially, but in legal language it is known as a framework facilitating sustainable investments, in accordance with the provisions of the Regulation of the European Parliament and of the Council [1]. The aim of the Taxonomy Regulation is to increase the level of environmental protection by replacing environmentally harmful investments with environmentally friendlier alternatives. The Taxonomy Regulation is a classification tool for financial institutions, enterprises, and investors that allows them to determine the impact of their activities on the environment. It defines the criteria an activity must meet to be regarded as environmentally sustainable.

The aim of our study was to analyse the assumptions of the taxonomy specified in the contents of Regulation 2020/852 [1] as a framework facilitating sustainable investments, indicate the role it plays in the European Green Deal, and identify its potential influence on the forest sector. The environmental, legal, and economic conditions for implementing the regulation were examined. The addressees of the regulation and their responsibilities were indicated, along with the potential benefits resulting from the use of the taxonomy. A list of financial instruments compatible with the regulation was presented.

Special attention was paid to forestry and forest management with reference to the regulation. The authors of this study made an attempt to position this sector in relation to

the Taxonomy Regulation itself and other areas of the economy. The study also presents the procedures for qualifying forest activity processes within the Taxonomy Regulation.

Regulation 2020/852 [1] together with delegated acts was reviewed. The assumptions were implemented by reviewing normative acts, available scientific publications, and comments. In the final part of this study, the procedure for qualifying forest activities is presented and conclusions, as well as practical recommendations, are formulated. The following methods were used in our study: analysis of publications, analysis of processes, and synthesis of results.

2. Materials and Methods

The materials were obtained as a result of reviewing the legislation in force in the European Union. The availability of all materials and data related to the publication is due to EU regulations and Eurostat. The databases discussed include the European Parliament and Council (EU) regulations, the database Google Scholar, Scopus, and Web of Science. Our searches were conducted on documents in all languages based on titles and abstracts containing the keywords 'green deal', 'taxonomy', 'development finance', 'sustainable forestry', and 'EU Forest Strategy' published by May 2024. Then, analysing the references in the assumed papers, we added digital documents that were difficult to track. For the papers, we only considered documents produced by researchers that had undergone an expert review process in order to be sure of the scientific strength of the legal descriptions.

This manuscript presents the results of a literature review of taxonomy as a classification system for identifying environmentally sustainable economic activities with an emphasis on the scope of forestry.

3. Review and Discussion

3.1. Environmental, Legal, and Economic Conditions for the Development of the Taxonomy Regulation

In 2018, the European Commission started working on the concept of the Green Deal, which covered the production processes and the provision of services that should ultimately eliminate pollution of the environment [33] and guarantee its protection [34]. Climate change is a climate risk that combines physical (environmental changes) and transactional risks [35]. Due to the fact that few economic theories take the environmental aspect into account, these issues are consequently omitted at the decision-making level [36]. Companies emitting higher amounts of CO_2 record lower returns on shares, because the environmental awareness of investors is increasing [35]. In the plan for the sustainable financing of economic growth, a system of uniform classification of sustainable activities is the most important element of environmental sustainability of investments because it enables the flow of capital towards sustainable ventures. Transport, forestry, agriculture, and changes in the land use structure are factors that significantly influence CO_2 balance in the atmosphere [37].

According to the Eurostat data, between 2020 and 2023 the annual volume of CO_2 emissions generated by the NACE 2 sector (agriculture, forestry, and fishing) did not exceed 100,000 tonnes in relation to the total amount of emissions generated by other EU activities, i.e., about 8–10%, depending on the total emissions from other activities in a specific year [38]. The share of environmental taxes in relation to the GDP in the EU member states amounted to 2.44% in 2016 [39]. In 2019, the amount of these taxes reached 330 billion euros, where 75% of this sum came from energy taxes and fees for greenhouse gas emissions [40]. The process of increasing ecological taxes in the EU is related to the form of taxation, standard taxes, and various forms of environmental protection fees [41,42].

The Decision of the European Parliament and the Council of the EU 1386 [13] indicated the need to increase the financing of expenditures on the environment and climate by the private sector. This can be achieved by systems of incentives and methods stimulating enterprises to measure the environmental costs of their activities and profits gained on environmental services. One of the potential benefits for forest owners and managers is the

introduction of fees for the positive external social, environmental, and protective effects of forests.

The Taxonomy Regulation is a directly applicable law based on the presumption that the provisions of the EU Regulation are commonly known (Figure 1).

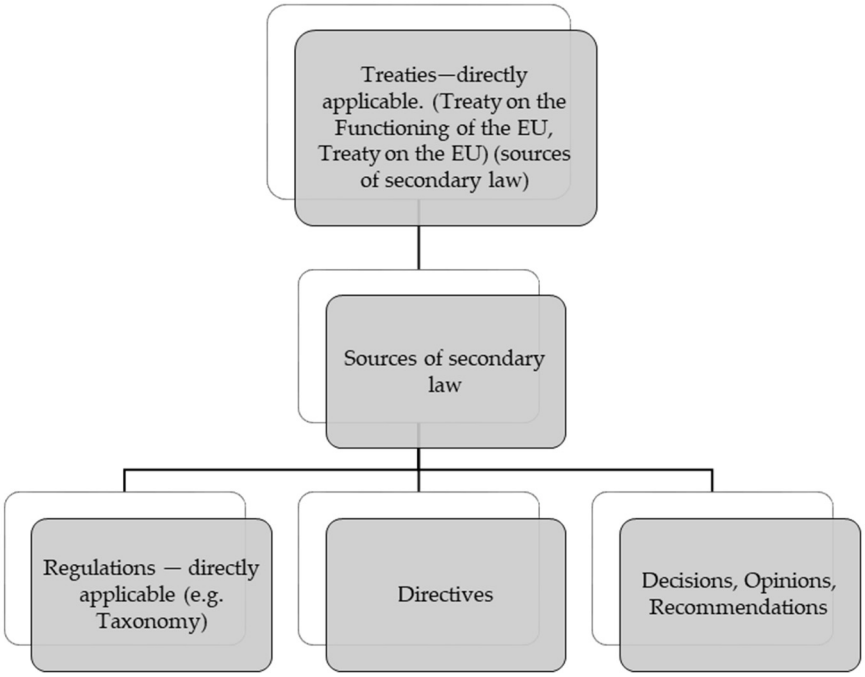

Figure 1. The position of the Taxonomy Regulation in the system of sources of law in the European Union.

The Taxonomy Regulation is not a form of certification or assessment of activities or projects. It is a set of guidelines used for verification whether a particular activity meets the criteria of sustainable development in terms of climate. The essence of the Taxonomy Regulation is to redirect the flow of capital aimed at achieving the goals of sustainable development set by the EU. The framework of the Taxonomy Regulation does not discriminate against environmentally harmful projects, but it rewards ecological solutions. The Taxonomy Regulation was developed to support transparency and longtermism in sustainable financial activity and the economic implementation of the European Green Deal. The interrelationship between the Taxonomy Regulation and the European Green Deal is shown in Figure 2.

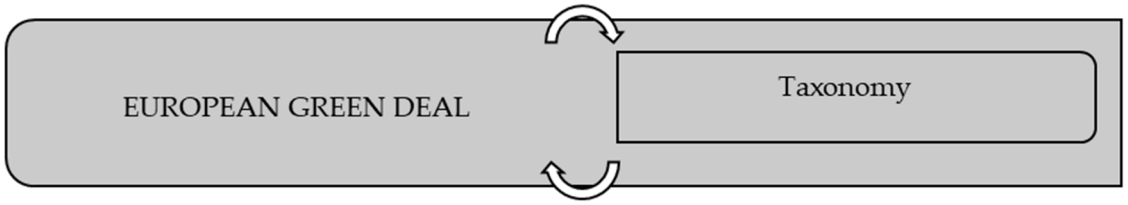

Figure 2. The interrelationship between the Taxonomy Regulation and the European Green Deal.

3.2. Financial Instruments in the Taxonomy Regulation

The aim of the Taxonomy Regulation is to create benefits for entities and enterprises following the rules of ecological activities. The Taxonomy Regulation is treated as a tool stimulating the demand for green investments in specific economic areas. Capital can mainly be obtained from subsidies, loans, and by issuing securities (shares, bonds). 'Green bonds' [43], also known as the Climate Bonds Initiative (CBI), will play a special role in the Taxonomy Regulation [44]. They will be used to finance projects improving the state of

the natural environment, including the development of a low-emission economy reducing climate change [44–46]. The next regulation, 2023/2631 [47], on European green bonds, is to be conducive to building investor awareness and trust. The document presents the concept of green bonds and proposes the establishment of appropriate issuance structures in the EU member states [48]. It stresses the need to enable both investors and entrepreneurs to easily determine and authenticate environmentally sustainable investments by clear labelling of retail investment products and the development of a European green bond standard. The EuGB is also a set of rules for issuers to follow so that this instrument can be called a European green bond. It stresses consistency with the principles of the Taxonomy Regulation, the Corporate Sustainability Reporting Directive 2014/95/EU [49], and the Capital Markets Union in the EU. The introduction of financial products and corporate bonds as environmentally sustainable investments is part of the solution to the problem of 'pseudoecological marketing', i.e., unjustified classification of activities as environmentally friendly. The regulation on green bonds and taxonomy are to enable the use of revenues to finance business activities leading to the achievement of sustainable environmental goals. The document contains a wide range of possible applications, e.g., a company, bank, or the state issuing bonds to finance a loan, funds for new technology, financing subsidies for renewable energy installations, etc. The transparency of the procedures is to be guaranteed by introducing the obligation for emissions to be inspected by external auditors before and after the issuance and reporting on the allocation of issue proceeds. The importance of the common standard and bonds as a financial instrument will grow, thus determining the development and mobilisation of capital and the diversification of the investor base [50]. Favouring these solutions by the public sector will be of key significance in the Taxonomy Regulation, as this will be an environmentally friendly initiative [51], creating a positive image of the issuer. Lower emission costs may result from the SFDR, as well as from the growing demand, which has so far exceeded the emission value [52]. This element of the Taxonomy Regulation is supposed to reveal the level of integration of sustainable development factors in investment products. In 2007, the European Investment Bank (EIB) introduced green bonds [53], thus beginning a new trend in the issuance of securities. Currently, the EIB is the largest international issuer of green bonds. In 2020, its GB issuance amounted to 10% of the total bond issuance value [54]. Between 2019 and 2022, the share of these bonds in the total EIB issuance increased by 20% from the original 7%. In 2022, the value of bonds issued by European countries was approximately 229 billion dollars [38,55]. Being the EU climate bank, the EIB management board decided to align all its financial activities with the goals of the Paris Agreement [11]. This means that in the future all financial activities are to be consistent with the assumptions of the Taxonomy Regulation.

Sustainable financing is to be supported by various public incentives, such as a special investment fund, grants, and consulting for projects supporting sustainable development. These actions have been taken to activate private capital in areas undergoing transformation in accordance with the assumptions of sustainable development [56]. The importance of the Taxonomy Regulation is a reference point for obtaining funds from the Just Transition Fund, which has a budget of 17.5 billion euros. This fund is part of the Invest EU programme, which provides an EU budget guarantee for loans received from the EIB, national development banks, and other financial institutions, mobilising private and public funds for EU investments. The allocation of private capital in the economy will depend on the credibility of the adopted climate policies, which influence investors' perception of investment risk [57]. An important issue for practitioners and policy makers is the predictability of the taxonomy's potential effects on their investments, such as changes in the cost of capital or reallocation of capital by other investors [58]. Investors may interpret ESG performance as a signal of future stock performance and/or risk reduction in times of crisis [59]. Other instruments of the green transformation are the Modernisation Fund, Horizon Europe, the Innovation Fund, and the LIFE Programme. The LIFE Programme is particularly important for forestry, as it is entirely used for financing environmental and climate-related projects. Approximately 90% of EU funds for forest areas come from the European Agricultural

Fund for Rural Development (EAFRD) [60]. Uniform legal and economic criteria in all EU member states, showing compliance with the EU standards, will remain an important element encouraging potential investors to engage their capital in environmentally sustainable investments. The comparability of data is to ensure that the investor can make decisions based on Environmental, Social, and Governance (ESG) factors. Taxonomy appears to be a key step towards reducing transaction costs and information asymmetry [61]. It has been demonstrated that companies recognise the benefits of leveraging debt for green investments and are increasingly opting for bank loans to finance new green projects [62]. Organizations that excel in areas related to biodiversity, water management, or pollution prevention are experiencing relatively favourable conditions for long-term financing. The incorporation of Environmental, Social, and Governance (ESG) criteria into portfolio management serves as an effective tool for systematic credit risk management [63,64]. The lack of transparency was also highlighted in transparency underpinning ESG ratings and the methodologies employed in their construction. Bassen et al. [65] investigated equity markets and the potential premium associated with the implementation of green taxonomy, which is expected to increase with the growing attention from investors. However, they found that traditional ESG assessments do not provide sufficient evidence to support this notion. Furthermore, the absence of consensus regarding ESG ratings not only limits the findings of empirical analyses but may also adversely affect firm value due to heightened levels of uncertainty. Taxonomies and disclosure requirements can be commodified and influenced by conflicts of interest [66]. Baghai and Becker [67] discovered that companies that compensate rating agencies for additional advisory services tend to receive higher ratings, despite exhibiting a clearly higher risk of default, an effect that intensifies with the amount paid for advisory. Therefore, companies should enhance the credibility of the information they disclose [68,69].

3.3. The Influence of the Organisational and Legal Form of a Business on Obtaining Capital from Environmentally Sustainable Sources

The direction of obtaining external capital depends on the legal form of a business. The advantage of private ownership of forests results from the financial strengthening of forest production. However, protective and non-productive functions are still the domain of public forests. The state is obliged to provide public goods because market mechanisms do not apply to the non-productive functions of forests. Any consumer can use these goods, regardless of whether they are ready to pay for them. In forest management, these are non-use values or consumptive and non-consumptive use values, the provision of which generates costs [70]. Many authors of scientific publications indicate the fact that wood production and nature conservation are mutually exclusive [71–73]. The state may use legislative, legal, and fiscal measures for the redistribution of public goods [74–76]. Currently popular forest subsidy systems, used in many countries, are an important source of financing. Their recipients are forest owners with larger sizes. This indicates a lack of uniform use of subsidies and, consequently, a lack of motivation on the part of smaller owners to achieve climate goals [77].

Depending on the organisational and legal limitations of entities, capital for environmentally sustainable activities in forests can be obtained from EU funds, loans, or by issuing green bonds. They are used for sustainable projects, including those which do not generate profit, such as retention activities or nature conservation. Capital can be acquired as compensation for the loss of benefits resulting from the non-production functions of forests. In Central European countries, it is mostly state forests that provide the production, social, and protective functions. For example, in Poland it is the State Forests National Forest Holding—a state-owned organisation which is not a legal entity or enterprise. Sustainable management is difficult when forests are in private hands and their ownership is fragmented. There are problems with access to infrastructure and knowledge, and it is difficult to make profits [78,79]. The fragmentation of private property significantly limits the possibility to achieve sustainable development in forestry and maintain the

multifunctional model of forests. Sustainable forest management may be impossible due to urbanisation, changes, and fragmentation of forest ownership, as well as increasing expectations to achieve the assumed goals [80,81]. This situation can be prevented by establishing larger organisations and associations uniting forest owners. For example, owners of private forests in Germany are united in 14 associations in the federal states. In Finland and Sweden, private forests belong to 'family forestry'. In Austria, private owners of forests are obliged to be grouped in chambers. In Poland, administration in private forests is limited to supervision by local government units. The forms of management adopted in different countries differ significantly in centralised countries and in federal countries with broad regional self-determination, so the developed national strategies may have a limited impact on autonomous regions, thus making it difficult to coordinate policies at the EU level. This diversity may be an opportunity to develop locally adapted regions, operating on the basis of various policies [82].

Due to administrative problems, the European Commission (EC) issued technical screening criteria and exempted small forest farms (smaller than 13 ha) from an analysis of climate benefits. Instead, every 10 years such farms will have to make a group assessment together with other farms to certify their calculations [83].

3.4. Data Processing for Reporting in the Taxonomy Regulation

Appropriate collection and management of data that is necessary to check compliance with specific criteria is a key challenge for using the Taxonomy Regulation in forest management. This may cause the need to apply operational submeasures following the principles of environmental sustainability and provide obligatory information specified in Regulation 2021/2178 [84]. According to this document, it is necessary to disclose the percentage share of business activities meeting the requirements of the sustainable environment taxonomy. For example, in Poland, the State Forests National Forest Holding introduced changes in accounting [85] for more non-productive forest ecosystem services and thus enforced a new approach to cost settlement. The initiating factors are social trends, ecology, and the social capital of forests. The proposal is to implement management accounting, adapt the chart of accounts to the activities of the State Forests National Forest Holding within its segments, develop a new methodology of settling indirect costs for new facilities, allowing for non-production functions of the forest, and target management reporting at internal and external recipients [86]. At the same time, the cost-recording system in forestry should be adapted accordingly so as to record outlays on shaping the social functions of the forest [87,88], which requires management accounting. Forest management strongly influences socioeconomic development [89]. It is based on a set of information and accounting knowledge [90] and the assessment of the influence of forests on climate change mitigation, reflecting changes in forest management practice and allowing for historical factors. This will enable the comparison of forests performing the ecological function of sustainable development with other sectors of Greenhouse Gas Emissions (GHG) [91]. The Taxonomy Regulation is a particularly important standardisation tool, which can verify individual activities of entities. It can also apply to organisations, companies, or the issuer of green bonds. Environmental, Social, and Governance (ESG) assessments are widely utilised external information sources in investment decision making [92,93]. ESG ratings exhibit variability among different data providers, which influences investment decisions due to uncertainty regarding a company's sustainability performance. The EU Taxonomy has the potential to mitigate this discrepancy. Dumrose et al. [94] demonstrated that the environmental ratings from three out of four ESG data providers are significantly correlated with EU taxonomy. Taxonomy can reduce uncertainty in investment decisions, thereby ultimately enhancing market efficiency and lowering the cost of capital for firms [94].

3.5. Obligations of Business Entities Arising from the Taxonomy Regulation

Information on the obligation for enterprises to provide financial reports is given in Article 8, Regulation 2020/852, which refers to a Directive [1]. These regulations apply

to financial entities and other enterprises that are obliged to publish statements on non-financial information resulting from Articles 19 and 29 of the Directive. It was amended by a Directive [95], which regulates the subjective and objective scope of required reporting (Non-Financial Reporting Directive) for the entities concerned (Table 1).

Table 1. The criterion classifying entities obliged to provide reports on environmentally sustainable activities.

Status	Public Interest Entity
Balance sheet total	>EUR 20,000,000
Net revenues from sales	>EUR 40,000,000
Average number of employees in financial year	>500

According to Article 3 Section 4 of Directive 2013/34 [95], a large entity should be understood as one that exceeds two of the three criteria as of the balance sheet date. Since the SME sector also has an impact in the area of sustainable development, it has been covered by the reporting obligation resulting from the Directive 2022/2464 [96], which introduces a three-stage reporting obligation, starting from 2024 for large companies and ending with medium-sized and small listed companies, which will submit the first report for the financial year 2026. This document also regulates the scope of a broad information obligation (while maintaining the principle of due diligence) submitted by enterprises about their impact on the environment and society and indicating ways of limiting negative effects in the next reporting period. The possibility of reporting for the SME sector also results from the content of the preamble contained in the Technical Qualification Criteria. Reporting represents an increasingly significant issue in the realm of corporate sustainability and finance, necessitating a focused approach from regulatory bodies to enhance their understanding [97].

3.6. Environmentally Sustainable Business Activities—The Classification System, Scope, and Flow of Disclosed Information

The NACE system (Nomenclature statistique des activités économiques dans la Communauté européenne) is used for the classification of business activities in the European Union [98]. The system can be used as a starting point to determine the extent to which the activity of a specific business entity is sustainable. The next stage is to assess the degree of environmental sustainability or the investment portfolio. The term area, which is a broader concept than activity, applies not only to companies whose operational activities are related to, for example, forestry but also to all activities covered by it. This means that companies operating in a particular sector are obliged to submit declarations in many areas. For example, in the building industry, it may be necessary to indicate materials from forest production; changing the land use structure to non-agricultural use will apply to agricultural areas, etc. If the investment leads to the achievement of an environmental goal, the disclosed information should indicate the goal to which the investment contributes within the financial product, as well as the method and degree of its financing.

The financial market participants who do not take the criteria of environmentally sustainable investments into account are obliged to submit an appropriate declaration. The Taxonomy Regulation comprises the flow of data (Figure 3) providing information on one's own financial products and services, but it is based on information about the activities of other entities financing these products or services [99]. As the regulations have become more detailed in this area, financial market participants can increase transparency and make objective comparisons for end investors to see what percentage of investments environmentally sustainable business activity is.

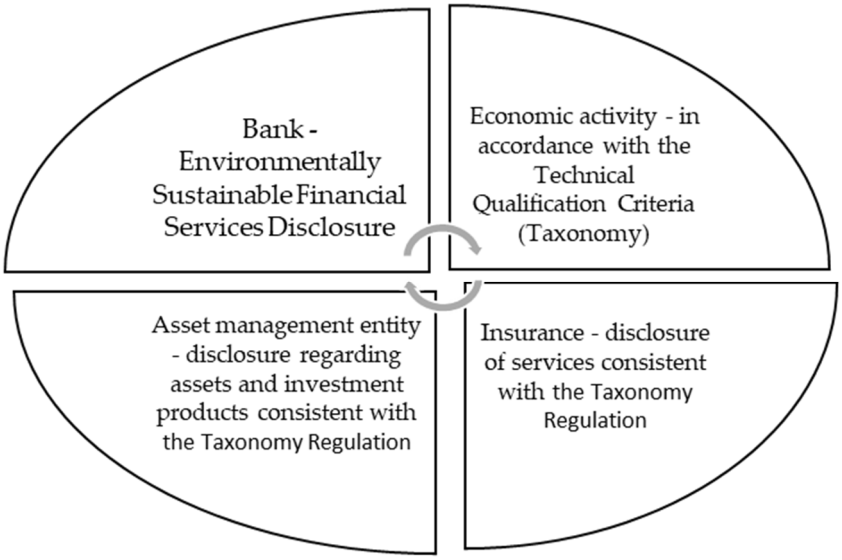

Figure 3. Data flow in the Taxonomy Regulation.

The information flow structure may be more complicated, e.g., the flow of information from bank to bank, from an asset management unit to an insurance company, from a subcontractor company to the main contractor, etc. This information is provided to show the size of investments made as part of a financial product, in accordance with the Taxonomy Regulation. They are expressed with the following coefficients: the 'green' revenue value, CapEX (capital expenditure), and OpEX (operating expense). According to Article 8 of the Regulation 2020/852 [1] with delegated regulation 2021/2178 [84], the required scope (in the part for non-financial enterprises) is specified as a percentage of the turnover resulting from the business activity qualifying for the Taxonomy Regulation and business activity not qualifying for the Taxonomy Regulation in total.

- Turnover, i.e., KPI = $\frac{net\ income\ consistent\ with\ Taxonomy}{net\ sales\ revenue}$ = x% consistence with the Taxonomy Regulation;
- Capital expenditure, i.e., CapEx = $\frac{increase\ in\ assets\ or\ processes\ consistent\ with\ Taxonomy}{increase\ in\ fixed\ assets}$ = x% consistence with the Taxonomy Regulation;
- Operating expense, i.e., OpEx = $\frac{operating\ expense\ consistent\ with\ Taxonomy}{direct\ costs}$ = x% consistence with the Taxonomy Regulation;
- Qualitative information in which non-financial enterprises describe the nature of their business activity qualifying for the Taxonomy Regulation, explain the method of assessing compliance with Article 3 of the Taxonomy Regulation, and explain how they avoided double counting for turnover, capital expenditure, and operating expense in the KPI counter.

These data do not fully exhaust the demand for information of the authors of the regulation. They point to a wide range of other circumstances resulting from accounting principles, taxonomy compliance assessment, and contextual information. Key performance indicators (KPIs) are included in the Technical Qualification Criteria, which is Annex 1 of the delegated Regulation 2021/2139 [91]. For financial institutions, the related demand for information needs to be defined more broadly and with more details.

3.7. Assessment of Environmental Sustainability Activities of Business Entities

An activity can be classified as environmentally sustainable if it significantly contributes to the achievement of one of the environmental objectives, does not cause serious damage to any of the environmental objectives, is conducted in accordance with minimum guarantees, and meets the Technical Qualification Criteria arising from Regulation 2021/2139 [91]. The very fact that an activity is classified in the Taxonomy Regulation is

not sufficient for it to be considered environmentally sustainable. It also needs to meet the aforementioned environmental sustainability criteria. Entrepreneurs are obliged to provide information with the description of their business activity so that it is consistent and can be classified in the Taxonomy Regulation. The legislator provides for business activities that can be classified in the Taxonomy Regulation but do not meet the Technical Qualification Criteria.

The Technical Qualification Criteria (TQC) are another delegated regulation supplementing the Taxonomy Regulation. This document contains the criteria to determine whether an activity is environmentally sustainable or not. The TQC are a key tool responsible for the functioning of the Taxonomy Regulation, because the document gives details of general provisions. The basic catalogue of guidelines includes information on the nature, scale, and sector of a business activity, as well as other aforementioned requirements (e.g., the regulation in Article 10 of the Taxonomy Regulation—the activity leading to transition) or supporting activity, combined with qualitative and quantitative criteria. Under the regulation, experts are obliged to determine the TQC for a particular business activity, allowing for existing scientific and legal achievements, product life cycle (supply chain), labelling system, etc. The criteria must be clear and transparent. This is technical, specialist information related to technological development and scientific progress. A platform for sustainable finance has also been established. It consists of representatives of the European Environment Agencies, Supervisory Authorities, EIB, EIF, Fundamental Rights Agency, and a group of experts representing various groups. The platform is used for analysis, consulting, and monitoring of specific trends (for the EC).

When the activity has been qualified into one of the categories and one of the sectors (NACE codes), it is analysed for whether it meets at least one of the following environmental objectives:

- Mitigating climate change;
- Adaptation to climate change;
- Sustainable use and protection of marine resources;
- Transition to a circular economy;
- Prevention and control of pollution;
- Protection and restoration of biodiversity and ecosystems.

The fulfilment of each objective should be analysed in terms of the guidelines and indicators contained in Regulation 2020/852.

The DNSH (Do No Serious Harm) criteria, i.e., not causing serious harm to any of the environmental objectives, were also specified in the Taxonomy Regulation. In the TQC they were specifically parameterised and assigned to each of the objectives. It is important to allow for the environmental effects not only of the business activity itself but also to assess the environmental impact of the products and services provided by this activity. Apart from meeting the aforementioned conditions, the Taxonomy Regulation also requires that the business activity must comply with 'minimum guarantees'. These are standards set by the OECD for multinational enterprises and the UN. They emphasise the fact that businesses must be run responsibly and with due respect to human rights.

Supporting activity is defined in Article 16 Regulation 2020/852 [1] as an activity that does not directly contribute to stopping climate change but enables other activities to significantly contribute to the implementation of one or more environmental objectives. In the long term, these activities cannot be dependent on assets that may undermine environmental goals and must generate positive effects for the environment, taking the product life cycle into account.

The procedure for qualifying and presenting business activities in terms of environmental sustainability is shown in Figure 4.

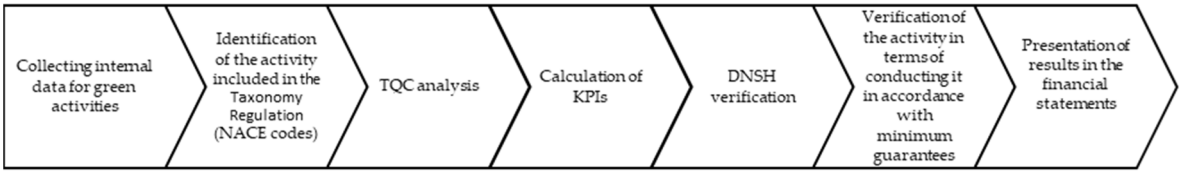

Figure 4. The procedure for qualifying a business activity and presenting environmentally sustainable data.

Regulation 2020/852 [1] is dynamic over time. This means that an activity that has been assessed as environmentally unsustainable may later, after appropriate technological development, be assessed as sustainable. While the taxonomy offers detailed criteria for designation in an ambiguous manner, there is a need for further research on how to measure companies' responses in both transforming their business models and strengthening their disclosure of environmentally sustainable activities [100].

3.8. Taxonomy in Forest Management

Forestry is one of the activities aimed at achieving the first goal (mitigating climate change). According to the Taxonomy Regulation, 'forestry is an economic activity that significantly contributes to mitigating climate change if this activity significantly contributes to stabilising greenhouse gases in the atmosphere..., prevents or reduces the emission of greenhouse gases, or increases the sequestration of greenhouse gases...'. Forests sequester CO_2 [101,102]. The role of experts is to define the TQC so that activities can strengthen and protect forest resources and enable them to fulfil their environmental function. This context can also be found in other regulations, such as the aforementioned LULUCF, the New EU Forest Strategy for 2030 [22], or the Directive 2018/2001 on the promotion of the use of energy from renewable sources [103]. A similar intention concerning forest areas was expressed in the preamble of the TQC. Forests also generate additional benefits; these are activities supporting other environmental goals listed in the Taxonomy Regulation. The consequence of this reasoning is the statutory delegation to define the TQC for activities related to afforestation, as well as forest reconstruction, management, and protection. This shows the need to take a much broader look at forest areas so as to include power-supplying and construction activities.

The following processes were identified in the forestry area: afforestation, forest reclamation and reconstruction, including reforestation and natural forest regeneration after extreme events, forest management, and forest protection. These activities should comply with the definitions of the national law, or in the absence thereof, with the definitions of the Food and Agriculture Organisation of the United Nations (FAO). Forest reclamation and reconstruction were treated exceptionally, as optional compliance with the definition of the Convention on Biological Diversity was allowed. Apart from afforestation, these activities do not involve any change in land use. Forest management is a business activity conducted in forests, which affects their ecological and socioeconomic functions. Forest protection includes forest activities aimed at preserving habitats and species. The share of afforestation-related activities in carbon dioxide sequestration amounts to only about 6%. Between 2011 and 2013, forest management generated about 40 million T of sequestered CO_2 [19]. Currently, forests bind 45% of the earth's organic carbon in biomass and soil [104]. Well-managed European forests capture approximately 10% of anthropogenic emissions in the 27 EU member states [105]. This prompts action to shift priorities from expanding forest area to economic investments in existing forests [106]. The greatest climate benefits can be expected from forest strategies targeted at high forest productivity, harvesting volume, and the effective, cascading use of biomass as a substitute material [107,108]. Species composition optimisation, soil protection, better protection against catastrophic events, and increasing the stock of harvested wood result in much greater amounts of CO_2 sequestered from the atmosphere than through afforestation. From an economic point of view, afforestation is a capital-intensive investment activity. Another issue is the increase

in CO_2 emissions on afforested soils (caused by changes in their native soil profile) and the risk of fire in existing meadows and savannahs [109]. Optimising species composition, soil protection, better protection against catastrophic events, and increasing stocks of harvested wood result in much greater amounts of CO_2 sequestered from the atmosphere than through afforestation. Deciduous forests have been shown to be more efficient at using photosynthesis in the long term. A higher percentage of deciduous tree species favours greater CO_2 storage in mineral soil, unlike coniferous tree species, which accumulate organic matter on the soil surface [110,111]. Afforestation of large areas involves the risk of monotony in the spatial development of the landscape [112]. In European countries, potential afforestation is threatened by activities implemented under the RDP [113]. Forest regeneration is considered a cheap option for carbon storage. To be effective, the CO_2 storage programme must be universal and international and cannot operate in isolation from other sectors of the economy. Excessive subsidies for afforestation may lead to a lack of supply of agricultural land, which may result in higher prices of food [114]. On the other hand, limiting wood harvesting may result in higher wood prices and, in consequence, an increase in the volume of wood harvested in the countries that do not respect the principles of sustainable development. However, afforestation and forest restoration may be a good complement to other tools used for climate change mitigation. In the long term, implemented afforestation programmes may stop global warming trends [115].

3.9. Taxonomy Regulation vs. the Concept of Permanently Sustainable Forest Management

The legal regulation referring to permanently sustainable forest management has not been precisely established in the legislative structure of the European Union, which has left this issue to the member states. Multifunctional sustainable forest management is applied in almost all state forests and some municipal woodlots in the EU [116]. In the Polish legal system, Article 7 of the Forest Act provides for sustainable development [117]. The provisions of the TQC are closely related to the concept of permanent and sustainable forest management, which emphasises the need to treat its ecological, economic, and social dimensions equally. The goals of sustainable forest management are complex and require a holistic approach to the forest as a living organism. The ecological dimension is related to afforestation, the protection of valuable natural resources, and the preservation and restoration of forest biodiversity. The economic dimension refers to the productive functions of forests. It involves keeping forest ecosystems in good condition, the constant monitoring of forests, preservation, and the use of reproductive material. Social goals are mostly manifested by improving the quality of life of the population [118].

3.10. Linking Forestry Activities with Other Activities in the Taxonomy Regulation

Besides appreciation of the role of forests in CO_2 sequestration, the Taxonomy Regulation emphasises their importance in providing building materials, renewable energy, and generating benefits for other climate goals and other activities. Processes such as acquisition, distribution, transport, and the production of biomass, ethanol, and energy are typical elements of the entire supply system [119,120], e.g., forestry (biomass production) and energy (the combustion of biomass with the lowest performance parameters) or forestry (wood production) and construction (wooden building materials). These examples of the supply chain do not take processing, trade links, or logistics into account. The functioning of a sustainable supply chain in forestry depends on cooperation with other entities [121]. Figure 5 shows the structure of an exemplary supply chain in forestry activities that enables achievement of a common environmental goal according to the TQC.

The growing role of activities in the energy sector related to forestry is manifested by the production of electricity from bioenergy, the use of biofuels and biogases in transport, the cogeneration of heat and cooling energy from renewable non-fossil gas and liquid fuels and bioenergy, and the production of heat and cooling energy from bioenergy. Examples of activities using forest biomass must meet the sustainability criteria specified in Article 3

of the Taxonomy Regulation and in Articles 29 Sections 2–7 and 10 of the Directive on the promotion of energy from renewable sources [103].

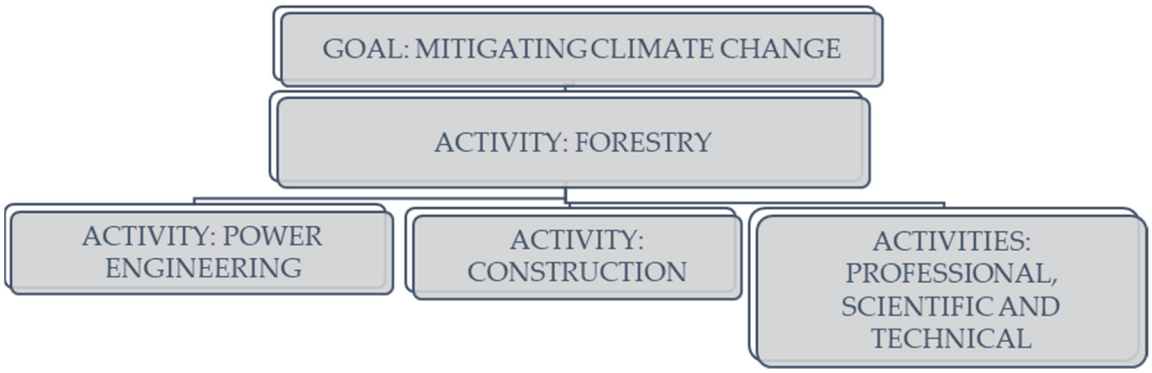

Figure 5. An example of a supply chain based on the Technical Qualification Criteria.

These regulations apply to limiting the risk of using fuels from forest biomass, which does not meet the criteria of sustainable development, the obligation to have national or regional regulations regarding biomass harvesting, and systems for monitoring and enforcing the legal order that will ensure the legality of harvesting, forest regeneration, and the protection of areas designated for nature conservation, ensuring technological harvesting operations preserving soil quality and biodiversity. Harvesting itself must maintain or improve the long-term productive capacity of forests. Currently, biomass is equivalent to 8% of the energy demand in the EU. Most of this raw material is consumed by industry and construction—49%—and it is used to generate energy—29%. The share of biofuels in transport amounts to 22% [122]. In the EU, the share of employment in the bioenergy sector amounts to about 50% of all jobs in the renewable energy sector. In 2017, the turnover of the biofuel sector amounted to 17 billion euros [108]. Forest biomass is of particular interest [123], because it is a substitute for the materials that so far have been used for construction and to generate energy [124]. It is constantly gaining significance among renewable energy sources as an important and strategic resource in the EU. This fact was particularly noticeable during the crisis caused by the war in Ukraine [125,126]. The import of forest biomass from outside the EU must be legally sanctioned to ensure the minimum criteria for sustainable development [122]. The forest can be considered a source of renewable raw materials only if its management meets the criteria of sustainable development [127,128]. This is particularly important in the context of construction-related activities, where the cascading use of biomass, supporting the circular economy, and recycling materials may be of key significance. The analysis of biomass resources in European countries also showed that there was no consistent definition of this raw material [129]. There is also a legal need to reflect the scientific confirmation that sustainably used forest biomass emits less CO_2 than other sources when generating energy. The demand for biomass may cause local economic growth in economically weaker regions, create jobs [122,130], and be the reason for the establishment of forest energy regions. This will enable the merger of economic entities into larger conglomerates, which will be supported with the state investment guarantees in forests belonging to the state treasury. However, before the decentralisation of the energy system, it is necessary to identify potential local social conflicts, take human rights into consideration, and to ensure proper management supporting the development of renewable energy [129,131]. Numerous studies point to the need for greater involvement of the EU member states. They also indicate the fact that institutions neither provide financial support nor promote the use of biomass [132]. Financial support offered under the Taxonomy Regulation should apply not only to biomass producers but also to the producers of the end product [133]). The strongest and most favourable correlations occur between economic and environmental innovations

and sustainable development results [134]. Both private and public investments in research and innovation are of key importance to the reduction in CO_2 emissions [108,135,136].

4. Conclusions

The assumptions of the Taxonomy Regulation and the EU implementing acts will influence and initiate changes in the forest policies of member states. Understood as a tool to support political strategies for sustainable development, the Taxonomy Regulation will enable operators to finance transformations to achieve environmental and climate goals. In EU member states, it is important to finance the environmental and social actions of actors through central mechanisms, such as the issuance of green bonds. Taxonomy regulation will be important in the EU. Taxonomy will affect economic and market processes.

Based on the research, it is expected that operators will strive to continuously increase ratios in line with the Taxonomy Regulation. This will also apply to the management of forest resources, forest product supply chains, and the provision of forest services. Taxonomic standardisation will ultimately affect financial flows, investments, and the allocation of private funds, as it will be more attractive to invest in projects or assets that are more beneficial to the natural or social environment.

Due to environmental and social needs, forestry in European countries is evolving towards ecological solutions, which increases costs and reduces revenues. It is necessary to develop a mechanism to subsidise forest management.

The European Community's pursuit of climate goals through sustainable forest management is not in opposition to the legislation of member states. The standards of the Taxonomy Regulation will be modified due to technological progress, changing legal and economic situations, scientific developments, and environmental and social priorities. The ambiguity of the criteria set forth in the regulation calls for further research into the response of companies in disclosing activities and adapting environmentally sustainable business models. The current Taxonomy Regulation does not clarify to what extent and under what conditions the various standards can be implemented by public entities, including state-managed organisations. These issues should be further analysed and studied. Further research should aim to assess the effectiveness of enforcement of the EU taxonomy with respect to its primary objective, which includes directing financial flows to sustainable activities, including those in forestry. Research should include strategic analysis and corporate decision making, as well as procedures related to reporting and disclosure systems for sustainable practices in the financial market. Additional research should include an analysis of the impact of taxonomy enforcement on reducing the misclassification or manipulation of information by market participants offering financial products.

In summary, the EU's taxonomy promotes exclusively sustainable economic activities, which is significant for mitigating global climate change. It supports investors in making capital allocation decisions and optimizing investment risk, thereby contributing to increased competitiveness among enterprises and economies. It fosters the adaptation of innovative solutions and environmentally friendly technologies. However, there are limitations in the implementation of taxonomy, stemming from ambiguous and unclear reporting processes. The discretionary interpretation and absence of clear rules and criteria for forestry activities and other sectors, aside from the 'greenwashing' phenomenon, may result in confusion among economic entities and deter them from adapting to taxonomy criteria.

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