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**DEBATING THE FUTURE PROSPECTS OF RESOURCE SUPPLY:
ADOLF VON GUTTENBERG, EUGEN OSTWALD
AND THE SECTION ON SUSTAINABILITY
AT THE INTERNATIONAL CONGRESS ON AGRICULTURE
AND FORESTRY, VIENNA 1890**

Abstract

Taking the International Congress on Agriculture and Forestry in Vienna 1890 as an example, the article examines controversies about the future prospects of timber supplies. Two participants at the congress, Adolf von Guttenberg and Eugen Ostwald, demanded an end to sustainable forest management. In their opinion, the railway, as a new transport technology, would enable a balance between regions of timber shortage and regions of abundance. Guttenberg's and Ostwald's presentations provoked heavy criticism and led, in the following years, to a fundamental debate about appropriate concepts of forest management. In the debate, three aspects were controversial: (1) the effects of railway transportation; (2) the consequences of the increasing timber consumption; (3) the effects of the timber frontier that was advancing, in particular, in Northern and Eastern European woodlands. As a result, the debate led to an ongoing process of *rescaling sustainability*. Since the 18th century, (classical) concepts of sustainability had been based on *local* schemes of calculation. By contrast, since the mid-19th century, the growing railway network overcame topographical barriers that had been a pre-condition for local-scale sustainable forest management; in addition, the advancing timber frontier continuously opened up newly accessible woodland areas. Experts were forced to continuously gather new data and to steadily rescale their planning. In schemes for future resource management, space was no longer a constant, but a rapidly changing variable.

Key words: Forestry, sustainability, timber frontier, Eastern Europe, railway

Słowa kluczowe: gospodarka leśna, zrównoważony rozwój, granica lasów, Europa Wschodnia, kolej

I. INTRODUCTION

Since the 1970s, the term “sustainability” has had a broad application.¹ In particular, publications by the Club of Rome (*Limits to Growth*, 1972)² and the World Commission on Environment and Development (the Brundtland Commission’s report, 1987)³, and many other documents, agendas and reports, use the term in order to outline perspectives on future ecological and economic challenges. Some of these documents refer, in a more general way, to the origin of the term “sustainability” in 18th-century German forestry sciences. Recent years have seen a wide variety of texts devoted to Hans Carl von Carlowitz and his work on “*Sylvicultura Oeconomica*”⁴, which was published 300 years ago in 1713.⁵ In an article in 2010, Richard Hölzl criticized the fact that many publications today use references to Carlowitz and the other main figures of early modern forest sciences in order to construct a coherent narrative of the development of forest sciences as a successful academic discipline.⁶

From a bird’s eye view, two different types of forest resource management can be observed in Europe during the 18th and early 19th centuries. On the one hand, coastal regions were able to import timber from other countries. People in coastal regions secured their supplies of wood and timber by establishing and maintaining trade networks with the supplying countries. On the other hand, in inland regions with no access to coastal harbours or floatable rivers, it was a pure necessity to run the local forests in a sustainable manner. As timber was (and is) a heavy good, it could be transported on overland routes only for very short distances. Since the Middle Ages, historical documents have provided a wide variety of records about inland forest management that can be char-

¹ This article tackles core aspects of the author’s habilitation project (second book) that will be published soon: Ch. Lotz, *Nachhaltigkeit neu skalieren. Internationale forstwissenschaftliche Kongresse und der Streit um die Ressourcenversorgung der Zukunft im Nord- und Ostseeraum (1870–1914)*. An Open Access Version of this text will be available on www.europa.clio-online.de.

² D.H. Meadows, D.L. Meadows, J. Randers, W.W. Behrens, *The Limits to Growth*, Cambridge (Mass.) 1972.

³ *The World Commission on Environment and Development: Our Common Future*, Oxford 1987.

⁴ H.C. von Carlowitz, *Sylvicultura oeconomica, oder haußwirthliche Nachricht und Naturmäßige Anweisung zur wilden Baum-Zucht*, Leipzig 1713.

⁵ For example B. Müller, *Unser kaltes Herz. Es gab schon einmal eine tiefe Rohstoffkrise — um das Holz*; Süddeutsche Zeitung, 24/ 25 May 2008; G.A. Jahn (ed.), *Die Erfindung der Nachhaltigkeit. Leben, Werk und Wirkung des Hans Carl von Carlowitz*, hrsg. von der Sächsischen Hans-Carl-von-Carlowitz-Gesellschaft e.V. zur Förderung der Nachhaltigkeit, München 2013.

⁶ R. Hölzl, *Historicizing Sustainability. German Scientific Forestry in the Eighteenth and Nineteenth Centuries*, *Science as Culture* 24 (2010), pp. 431–460, here 437.

acterized as “sustainable”. In the course of decades and generations, people in inland regions gathered knowledge about how to manage “their” forests in order to maintain a constant supply of goods for all spheres of everyday life and business.⁷

However, since the 18th century, the rising forest sciences transformed traditional knowledge about sustainable forest management into a standardized form of knowledge. The main reason for this transformation was the powerful claim of “improvement” and efficiency. As a growing number of businesses and mining projects demanded an increasing quantity of timber, forest sciences claimed that they could “improve” the forests in order to supply the wood demanded. At the same time, traditional forest uses, such as woodlands as pasture for livestock, were outlawed from the forests. In forest sciences, “sustainability” or “sustainable management of forests” aimed at calculating and supplying a continuous amount of a specific sort of product: mainly timber for building purposes or wood for charcoal production.

Of course, the differences are obvious between the meaning of “sustainability” (in German, “Nachhaltigkeit”)⁸ in forestry sciences during the 18th and 19th century and the global scope of sustainability in, for instance, the “Brundtland report” of 1987. Obviously, very fundamental changes took place in the interim period. However, authors, even in recent publications, do not go into detail regarding these changes.

Therefore, this article sets out to shed light on how and why the term “sustainability” changed its meaning in the course of history. It will examine the question of how forestry experts debated the spatial dimension of sustainability, why this dimension changed and to what extent experts reflected on interrelations between the changes of resource management concepts on the one hand, and technological innovation and economic challenges on the other hand.

In order to explore these questions, the article takes the 1890 International Congress on Agriculture and Forestry in Vienna as an example, because debates on sustainability at this congress played a major role. The main sources are planning documents and correspondence regarding the congress, as well as reports about the congress’ debates in forestry journals from various European countries.

⁷ P. Warde, *The Invention of Sustainability*; *Modern Intellectual History* 8 (2001), pp. 153–170; E. Ostrom, *Governing the commons. The evolution of institutions for collective action*, Cambridge 1990, pp. 61–69.

⁸ In 1713, Carlowitz wrote about “eine kontinuierliche beständige und nachhaltige Nutzung” (i.e. a “continuous and sustainable use”), see H.C. von Carlowitz, *Sylvicultura oeconomica*, p. 105. The noun “Nachhaltigkeit” appeared in a book by G.L. Hartig, *Anweisung zur Taxation und Beschreibung der Forste*, 2nd edition, Gießen–Darmstadt 1804, p. 1.

II. INTENSIFYING TRANSNATIONAL EXCHANGE: INTERNATIONAL CONGRESSES AND FORESTRY ISSUES

In early modern times, the main vehicles of the transnational exchange of views about forestry issues were journals and forestry schools. Journals reported on the conditions of forestry abroad, on expeditions or travel in foreign countries and reviewed foreign forestry books. Forestry schools or even early forms of forestry academies — in particular, the French one in Nancy as well as German academies in Tharandt, Munich or Eberswalde — attracted students and scholars from many different countries.

A new arena for cross-border exchange was opened when, in the 1850s, international meetings started to tackle a wide variety of economic and social issues: for instance, at the International Statistical Congresses.⁹ In 1873, the Austria-Hungarian government organized a world fair and, using this chance, invited contributions to an “Internationaler Congress der Land- und Forstwirthe”.¹⁰ In the history of transnational exchange in forestry, this 1873 congress can be seen as the first international congresses devoted specifically to forestry. The congress took place in Vienna, 19–24 September 1873 and gathered about 300 participants. The majority came from Austria-Hungary, but many other European countries succeeded in sending delegates to the meeting. In the following decades, many congresses took place that tackled forestry issues. The organizers announced the congresses with different names, i.e., “Congrès international de l’agriculture” or “Internationaler land- und forstwirtschaftlicher Congress”.¹¹ At some congresses, agriculture dominated the debates and forestry played only a minor role; other congresses were completely devoted to forestry or included large panels or sections on forestry issues.

The economic background of these congresses during the second half of the 19th century was characterized by an enormous growth in industrial production and an increasing consumption of timber. Building and construction projects, railways, mining and many other business branches demanded wood

⁹ N. R a n d e r a a d, *The International Statistical Congress (1853–1876). Knowledge Transfers and their Limits*, *European History Quarterly* 41 (2011), pp. 50–65.

¹⁰ J. v o n C h l u m e c k y, *Stenographische Protokolle des ersten Internationalen Congresses der Land- und Forstwirthe (19. bis 24. September 1873)*, Wien 1874; Ch. L o t z, *Nachhaltige Herausforderung. Internationale forstwissenschaftliche Kongresse und die Maßstäbe zukünftiger Ressourcennutzung, ca. 1870–1914*; in: *Wissen transnational. Funktionen — Praktiken — Repräsentationen*, ed. J.A. Turkowska, P. Haslinger, A. Schweiger, forthcoming 2016.

¹¹ See for example *Congrès international de l’agriculture, tenu à Paris, 11–19 juin 1878*, Paris 1879; M. v o n P r o s k o w e t z (ed.), *Bericht über die Verhandlungen und Beschlüsse des internationalen land- und forstwirtschaftlichen Congresses*, Wien 1890.

and timber. The import of timber to Great Britain, for instance, rose from 3.4 to 10 million tonnes between 1864 and 1899.¹²

III. ADOLF VON GUTTENBERG, EUGEN OSTWALD AND THE DEBATE ABOUT THE FUTURE OF SUSTAINABILITY

In 1890, an “Internationaler land- und forstwirtschaftlicher Congress” was held, again in Vienna. Roughly 1,000 participants took part. Section VI of the congress was devoted to forestry. Among many other issues, the forestry section included a panel on sustainability. Two speakers addressed their arguments to the audience: Adolf von Guttenberg and Eugen Ostwald. Guttenberg was a Professor of Forestry (“forstliche Betriebslehre”) with the Hochschule für Bodenkultur in Vienna. Ostwald was head of the forest research station near Riga. The two presentations of Guttenberg and Ostwald bore the same title: “To what extent is it possible (given today’s economic situation and forest management planning) to maintain the claim of sustainable forest uses?”¹³

In his introduction, Guttenberg examined the state of the art in forest management and outlined three different forms of sustainability: (1) sustainable management as a constant supply of wood and timber from a given forest, (2) sustainable management in order to maintain the forest in a normal condition (“Normalwald”) and (3) sustainable management that aims at the highest financial revenue from a given forest.

Guttenberg argued that, in the past, sustainability had gained its legitimacy from the fact that local business and the local population had to take wood and timber from local forests. As timber was (and is) a heavy good, only regions with access to waterways had the possibility of transporting timber over large distances, while many inland regions had to rely on local wood resources. For Guttenberg, this form of sustainability belonged to the past. Rhetorically, he asked: “But how greatly have the circumstances changed! Timber [...] is transported today over the largest distances on railways and on waterways [...]. Today, a balancing of shortage and abundance [Ausgleich zwischen Holz-mangel und Ueberfluß] is possible over the largest distances — even between continents.”¹⁴

¹² W. Schlich, *The Outlook of the World’s Timber Supply*, Transactions of the Royal Arboricultural Society (1901), pp. 355–387, here 358.

¹³ A. von Guttenberg, *Inwieweit ist bei dem heutigen Stande der Wirthschaft und der durch dieselbe bestimmten Forsteinrichtungs-Praxis die Forderung strengster Nachhaltigkeit der Nutzungen überhaupt noch aufrecht zu erhalten?*, Centralblatt für das gesammte Forstwesen 16 (1890), pp. 364–372.

¹⁴ *Ibidem*, p. 365.

Guttenberg continued that, although conditions had changed, many foresters maintained the traditional principles of sustainability and, regarding state forests, foresters refused to aim for the highest *financial* revenue. Such neglect of the activity's financial aspects was, from Guttenberg's perspective, no longer appropriate. The state, he argued, no longer had the responsibility to secure the supply of wood and timber; trade had taken over this task. However, Guttenberg admitted, the state should assure "a constant revenue [gleichmäßigen Ertragsbezug] from its forests for the future".¹⁵ At the end of his presentation, Guttenberg suggested a resolution that summed up his argument: sustainable forest management should be maintained in forests of foundation by public law, as well as in forests of a *fideicommissum* of a family. For all other public and private forests, sustainable management should be abandoned.

Eugen Ostwald continued with the second presentation in this section. Ostwald agreed with Guttenberg's conclusion that wood and timber were no longer local commodities, but together comprised a "world trade commodity [Welthandelswaare]". Therefore, the "forest economy had to be organized following principles of the private sector of the economy [nach privatwirtschaftlichen Grundsätzen zu organisierendes Gewerbe]".¹⁶

Ostwald viewed as a particular advantage of forestry the fact that it was flexible. Forestry was able to intensify the cutting of timber in years when timber was in high demand. Conversely, in years with weak demand, trees could be kept in the forests, would grow further in size and would thereby increase their value. Ostwald suggested a resolution saying that "the claim for strict sustainability must be abandoned". However, the forest administration should record all "changes regarding the amount of forest capital [Änderungen in der Höhe des Waldkapitals]".¹⁷ In other words, when the forest administration allowed a forest area to be cut down, i.e., when it reduced the forest's capital, it should announce this reduction in the usual statistics.

After Guttenberg's and Ostwald's presentations, an intense debate began. Johann Friedrich Judeich, head of the Saxonian Forestry Academy in Tharandt, chaired this section and had the task of steering the discussion. Many speakers criticized the proposals. Bernard Borggreve, head of the Prussian Forestry Academy in Hannoversch Münden, launched an elaborated counterargument, because he saw the state forests as being in danger. Borggreve suggested avoiding use of the term "sustainability" in any regard, as "the term 'sustainability'

¹⁵ *Ibidem*, p. 368.

¹⁶ E. Ostwald, [without title, i.e. continuing "Inwieweit ist bei dem heutigen Stande der Wirtschaft..."]; *Centralblatt für das gesammte Forstwesen* 16 (1890), pp. 373–376.

¹⁷ Anonymous [probably Adolf von Liebenberg], *Der land- und forstwirtschaftliche Congress zu Wien 1890*; *Centralblatt für das gesammte Forstwesen* 16 (1890), pp. 515–553, here 536.

is hard to define”.¹⁸ Many speakers followed Borggreve in defending state-run forests. Finally, Albert von Bedő, head of the Hungarian forestry administration in Budapest, tried to sum up the counterarguments and suggested distinguishing only between two sorts of ownership: the private forest owner on the one hand, and, on the other hand, those “who were only allowed to use the forests [nur zur Nutzung des Waldes berechtigt ist (interimistischer Waldbesitzer)]” but who had the duty of maintaining the forest for future uses. The state, Bedő stressed, is the latter sort of owner.¹⁹

Finally, the congress participants adopted a resolution saying that sustainability should be maintained in forests owned by the state or by public corporations. Private forests should be used in a fairly steady manner, and the local authorities were to be given the appropriate scope in order to meet the current conditions of timber sales.²⁰ The content of this resolution was nothing more than a description of the reality in many European countries: state forest authorities maintained some sort of sustainable management, whereas private forest owners were free to decide whether to maintain or to cut down their forests. From the forest administration perspective, there were different ways of bypassing the expectations of maintaining the forest: in particular, selling state forests to private owners, thereby making money and avoiding the obligation to re-afforest the territory or to maintain any sort of sustainable forest management.²¹

IV. CHANGING TIMBER-TRANSPORT FACILITIES AND THE RESCALING OF SUSTAINABILITY

At first sight, this congress section was an example of the struggle between private and state-run forestry. By the end of the 19th century, many other branches in the economy saw similar conflicts. The section was also an example for the pursuit of forest administrations in many European countries to “prove” their usefulness by providing financial revenues from state forests.²²

Beyond that, the congress section lends insight into the changing interrelations between technological conditions and the concepts of resource manage-

¹⁸ *Ibidem*, p. 537.

¹⁹ *Ibidem*, p. 540.

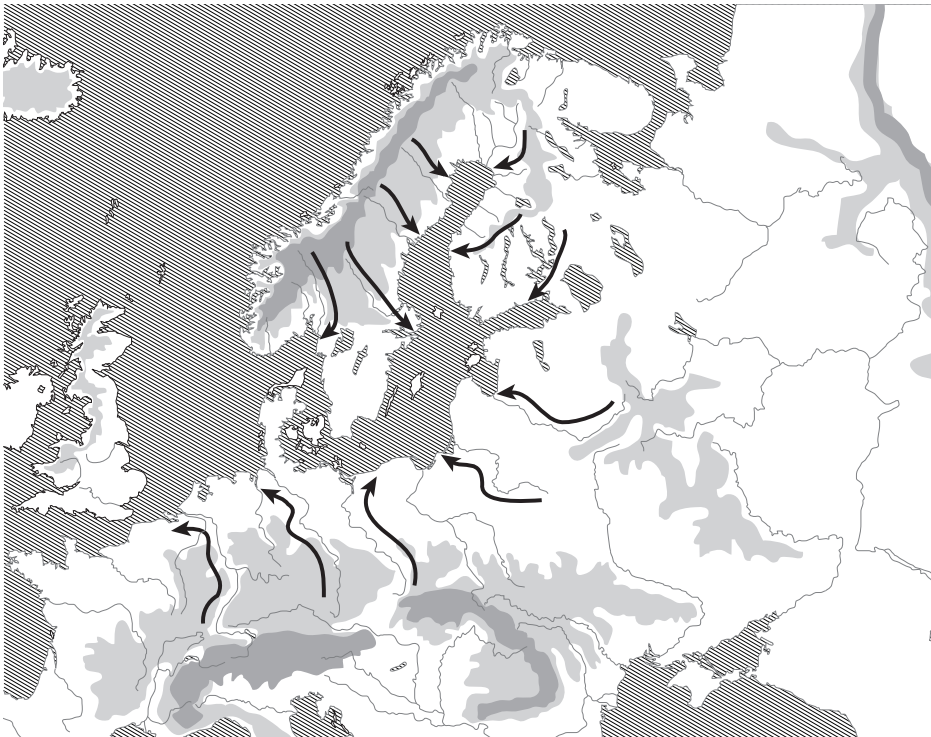
²⁰ *Ibidem*, p. 540f.

²¹ See for example J. B r o d a, *Gospodarka leśna (od połowy XIX w. do I wojny światowej)*, in: S. A r n o l d (ed.), *Zarys historii gospodarstwa wiejskiego w Polsce*, Vol. III, Warszawa 1970, pp. 607–657, here 609–612.

²² R. H ö l z l, *Umkämpfte Wälder. Die Geschichte einer ökologischen Reform in Deutschland 1760–1860*, Frankfurt am Main–New York 2010, pp. 465–472.

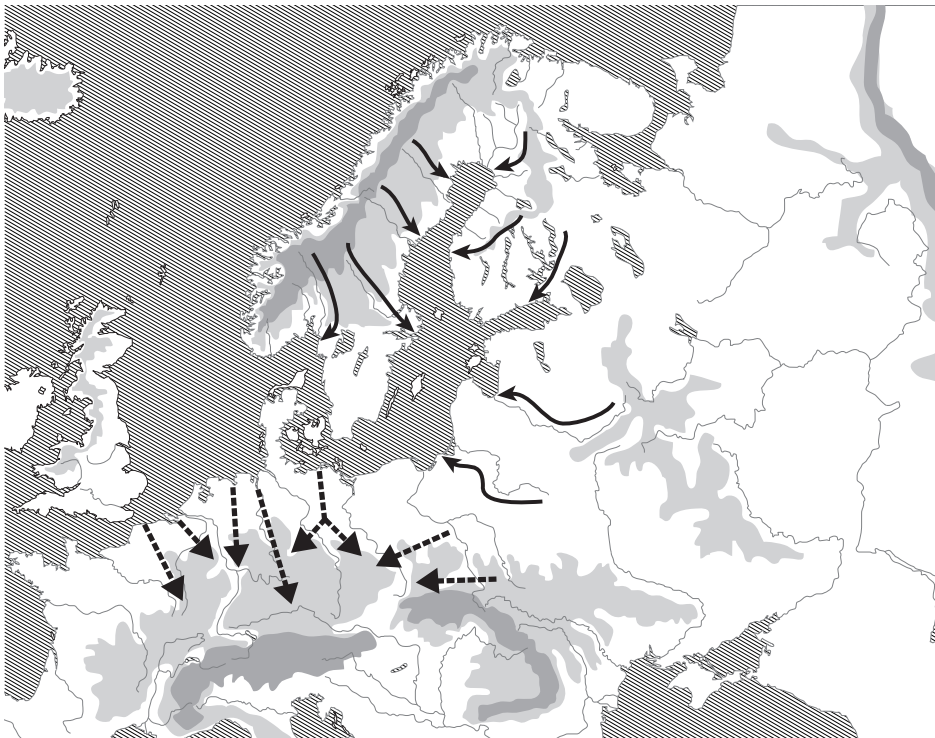
ment. In Guttenberg's and Ostwald's presentations, the term "sustainability" belonged to pre-modern times. When the term was introduced into forest terminology, i.e., during the 18th century, people in many inland regions were forced to maintain their local forests in order to secure future timber supplies. As outlined above, the heavy weight of timber made the waterways the only possible transport facility. The floating of timber on rivers gave timber transport a specific direction, i.e., following the stream from the mountains to the sea (mono-directional timber transport). In other words, the traditional concept of sustainable forest management was a product of inland topographical conditions.

By contrast, from the mid-19th century onwards, the railway as a new technology overcame many topographical barriers. It enabled a multidirectional timber transport; now timber could be transported in every direction. When railway tracks arrived in a particular inland region, the local people were no longer forced to rely on their local forests, but could import timber uphill from other regions via the railway.



Map 1. Mono-directional timber transport: Directions of timber floating in the Baltic and North Sea Region, c. 1800 (cartography: Christian Lotz, 2016)

It is particularly interesting to note that Guttenberg and Ostwald did not try to adopt the term “sustainability” to the new age of the railway. They did not fill the term with a new meaning, but used “sustainability” only in its pre-modern sense. They did not argue to extend the spatial scope of resource planning, i.e., to enlarge the term’s perspective to include all those forested territories that were connected by railways. Instead, Guttenberg’s and Ostwald’s presentations seem to suggest that the existing forests in Europe, or even worldwide, would provide sufficient wood and timber. In their fairly optimistic visions of future forest management, forests seemed to be endless and would be able to meet the ever-increasing demand caused by industrial growth.



Map 2. Multi-directional timber transport, Baltic and North Sea Region, c. 1900:
the railway (broken line) overcame many topographical barriers
(cartography: Christian Lotz, 2016)

Of course, Guttenberg’s and Ostwald’s optimistic presentations provoked criticism from various authors and speakers. Not only at the congress section in Vienna 1890 but also at subsequent congresses and in forestry journals throughout Europe, various counterarguments were put forward. In particular, major participants at the International Forestry Congress in Paris in 1900 stressed

a pessimistic perspective on the issue. In the opening lecture, Albert Mélard, head of the French forest administration, warned about a coming timber shortage.²³ This, again, provoked the criticism of optimistic experts, who followed Guttenberg's and Ostwald's argumentation. As a result, a general debate began, addressing in particular the capacity of northern and eastern European forests to supply the wood and timber demanded by future economic growth.

From a bird's eye view, three aspects formed the core of the debate. First, the impact of technological changes: in particular, the expanding railway network but also innovations in sawmill technology and wood processing (such as pulp production). Second, the growing consumption of wood and timber that was recorded in statistics on forestry and the timber trade, and that led to an increasing pressure on forests. Third, the advancing timber frontier, i.e., the restless movement of woodcutters and sawmills that pressed forwards into 'untouched' woodlands in northern and eastern Europe in search of marketable timber.²⁴

The debate about the advantages and disadvantages of these three aspects led to a process that can be characterized as a process of *rescaling sustainability*. As outlined at the beginning of this article, 18th-century sustainable forest management was based on a constant spatial framework. By contrast, from the mid-19th century onwards, experts faced continuously changing spatial conditions. In order to calculate the future prospects of timber supplies, experts continuously had to keep in step with the expanding railway network and the advancing timber frontier. Because both railways and the frontier steadily changed the spatial scope of the accessible resources and added new connections to possible timber markets, experts had to gather and to evaluate an ever-growing amount of data. These data were of very different qualities, as wooded areas in Europe were huge and diverse in many respects. Beyond that, the railway often made its way more quickly into wooded areas than the authorities were able to provide precise data about the forest resources of the respective area. At the same time, experts were able to advocate limits to the industrial exploitation of forests: for example, if the supply for the local population and business was in danger.²⁵ Experts had to adapt the spatial scope and

²³ A. Mélard, *Insuffisance de la production des bois d'œuvre dans le monde*; *Revue des eaux et forêts* 39 (1900), pp. 402–408 and 417–432.

²⁴ F. Sejersted, *Veien mot øst*; in: S. Langholm, F. Sejersted (ed.), *Vandringer*, Oslo 1980, pp. 163–204; J. Björklund, *Den nordeuropeiska timmergränsen i Sverige och Ryssland*, Umeå 1998; Ch. Lotz, *Expanding the space for future resource management. Explorations of the timber frontier in Northern Europe and the rescaling of sustainability during the 19th century*; *Environment and History* 21 (2015), pp. 257–279.

²⁵ For example Th. M. [possibly Thorvald Mejdell], *Om vore Skoves hurtige Forringelse og de nærmeste Følger deraf, samt om de nye Love, sigtende til at standse den videre Nedgang*, *Tidsskrift for Skovbrug* 2 (1894) pp. 97–104, 113–126, 129–134.

the time schedule of their calculations to the constantly changing conditions. They were constantly *rescaling sustainability* in order to provide a reliable outlook on future timber supplies.

V. OUTLOOK ON FURTHER RESEARCH PERSPECTIVES

In a broader perspective, the controversy about the future of timber supplies proved to be one segment of a variety of debates about the prospects of resource exploration and exploitation in the age of industrial production. Experts on fisheries, for instance, investigated reasons for the occurrence of bad hauls; they debated suitable measurements for ensuring a stable fish population.²⁶ There are striking similarities between fisheries and forestry. Although fishery experts did not use the term sustainability, they also operated with concepts that aimed at a durable management of fish resources. Regarding many non-renewable resources, such as coal or iron, geologists and engineers tried to calculate the limits of the accessible deposits. Some authors even connected these calculations with outlooks on future world politics.²⁷ It is a tempting challenge to analyse relations and similarities between these different segments of resource debates and specialized communities of experts. A variety of sources provide insight into these debates, such as scientific journals, government commissions and investigations, international congresses and resource maps with a regional or even a global scope.

Summary

The debate initiated at International Congress on Agriculture and Forestry in Vienna 1890 led to an ongoing process of *rescaling sustainability*. Since the 18th century, (classical) concepts of sustainability had been based on *local* schemes of calculation. By contrast, since the mid-19th century, the growing railway network overcame topographical barriers that had been a pre-condition for local-scale sustainable forest management; in addition, the advancing timber frontier continuously opened up newly accessible woodland areas. Experts were forced to continuously gather new data and to steadily rescale their planning. In schemes for future resource management, space was no longer a constant, but a rapidly changing variable.

²⁶ H.M. Rozwadowski, *The sea knows no boundaries. A century of marine science under ICES*, Copenhagen 2002.

²⁷ F. Frech, *Über Ergiebigkeit und voraussichtliche Erschöpfung der Steinkohlenlager*, in: *Lethaea palaeozoica*, Vol. 2, Stuttgart 1901, pp. 436–452.