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Von Freiberg nach Rio

Die ›Sylvicultura oeconomica‹
des Hans Carl von Carlowitz und die Karriere
des Begriffs ›nachhaltig‹ / ›sustainable‹

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‘Sylvicultura Oeconomica’
and the career of the term ‘sustainable’

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(Hans Carl von Carlowitz) 的 “Sylvicultura oeconomica”
以及 “可持续性” / “sustainable” 概念的发展历程

From Freiberg to Rio – Hans Carl von Carlowitz' 'Sylvicultura Oeconomica' and the career of the term 'sustainable'

by Ulrich Grober

In the German state Saxony, the wise use of resources has long been contemplated and at great depth, often with a global resonance. This tradition of deliberation is extraordinarily multifaceted. It extends from the 'Berggeschrey,' or mining clamour, of the silver boom during the Renaissance, through the discovery of uranium in the year 1792 and the tapping of the lignite deposits to the cessation of uranium mining and—most recently—to the founding of a 'World Forum of Universities of Resources on Sustainability—an initiative of the TU Bergakademie Freiberg. It ranges from the early forest ordinances of Electoral Saxony, through the establishment of the Tharandt Forest Academy in 1811 to the Dauerwald (continuous cover forest) concept of the 1920s and the more recent surveys of new types of forest damage. It encompasses the experiments of Baron von Tschirnhaus with solar concave mirrors around the year 1700, through Nobel Prize winner Wilhelm Ostwald's solar visions of the future in the 1920s to the present day development of a solar industry.

In the midst of this rich history, great names stand out: Paulus Nivis, the humanities scholar who, around the year 1490, decried the rape of mater terra, Mother Earth; Georg Agricola, the world renowned mining expert of the Renaissance; the geologist Gottlob Abraham Werner, Goethe's idol, who undertook the exploration of the lignite deposits while also educating Alexander von Humboldt, the 'first ecologist;' his contemporary Heinrich Cotta, the forester. In two universities in Saxony in particular, did contemplation of the use of resources become institutionalised earlier than anywhere else in the world, namely in the Bergakademie Freiberg, established in 1765, and in the Tharandt Forest Academy, founded 1811. Both achieved early world renown.

How should human interaction with nature be organised so that it is sufficient, economical and responsible? How do we approach the non-renewability of mineral and fossil riches provided by the earth? What do we do once the natural deposits are exhausted? How is the regrowth of renewable resources to be safeguarded in the long term? How can non-renewables be combined with, and supplemented and replaced by, renewable resources? The contemplation of and research into these questions has always been a story of trial and error, a quest. It was during this quest that the term that has undergone such a steep international career over the last twenty years was first coined.

Nowadays the whole world is taking about sustainability. Here is just one of many examples: "In an age in which we are denuding the resources of the planet as never before and endangering the very future of humanity, sustainability is the key to human survival." So succinctly did Sri Lankan lawyer Christopher G. Weer-

amantry, former vice-president of the International Court of Justice, state the case for sustainability. This view defines the status the concept of sustainability holds in the thinking of the international community today. In the summer of 2012, the UN's Rio+20 Conference—in spite of the weaknesses of the specific resolutions agreed—strengthened this position.

What is only little known, however, is that those committed to sustainability today are not only part of a large and growing global quest. They are also a part of a rich story. This story began not in our time, nor in the think tanks of the UN or the Club of Rome. This manner of thinking is ancient. It has deep roots in the cultures of the world. It is a spiritual heritage of global culture. The story of the word, the term, however, begins with a book written in Freiberg, behind the massive walls of a late-Gothic period building in the vicinity of the city's cathedral, a building in which for 350 years, almost without interruption up to the present day, the Saxony Chief Inspectorate of Mining has had its seat. This book was first published in Leipzig in the year 1713, three hundred years ago this year.

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The title sounds awkward. 'Sylvicultura Oeconomica – A Guide to the Cultivation of Native Wild Trees.' The author, Hans Carl von Carlowitz, held the office of Saxony's Chief Inspectorate of Mining in Freiberg. And his book is really quite something. It gifted us a semantic innovation that resounds to this day; an innovation that is indeed only now unfolding its full potential. When, in the German of the Baroque period, through repeated attempts, in circuitous, circular and tentative deliberative movements, it calls for the sustaining use (*nachhaltende Nutzung*, p. 105) of the resource wood in the service of the entire community (*gemeinen Wesens*) and that of the dear posterity (*lieben Posterität*), the reader is experiencing the linking of a specific word with a clearly defined idea. With this book, the elevation of this word to a term began; the beginning of the formation of the term sustainability. The book provides the blueprint for the guiding principle of our time.

Certainly the modern term has a considerably larger scope than it did to begin with. It addresses the greater whole. 'Sustainability' is a universal principle governing the use of all resources, governing indeed a transformation of our entire way of living; that is, the manner in which we produce, consume and in which we co-exist. For Carlowitz, the focus was on the sustainable use of the resource wood. Nevertheless, in the structures that are the foundation of the term, the connection to, and the continuity between, the 'Sylvicultura Oeconomica' and our modern concept are evident. If one reflects our modern discourse in the old source, incredible discoveries can be made. Whereas in 1987 the UN's Brundtland Commission defined sustainability as development 'meeting the needs of the present without compromising the ability of future generations to meet their own needs,' three hundred years ago Carlowitz was concerned with an everlasting use of wood (subtitle) for the greatest good of the entire community and, for their progeny, the greatest benefit (dedica-

tion). Where the Brundtland Report refers to future generations, Carlowitz speaks of 'dear posterity.' Where Gro Harlem Brundtland deems the 'conservation and enhancement' of the resource basis to be necessary, Carlowitz considers the 'conservation and cultivation of wood ... indispensable.' Where the 'Limits to Growth' report prepared by the Club of Rome in 1972 seeks a model for the future that is 'sustainable,' meaning immune to a 'sudden and uncontrollable collapse,' Carlowitz speaks of the fact that, without a 'sustainable use'¹ of the resource wood, 'the land cannot remain in its being,'² or maintain its existence (p. 105), and so collapses. Where economists of today, such as the American Herman Daly, conceptualise a steady-state economy, one that remains in 'dynamic equilibrium' or in a 'state of persistence,' Carlowitz talked of a 'steady, continual and sustainable use.'³

The analogies are striking. The issue today, as it was then, is to combine so that they become inseparable the provision of the current generation with the welfare of the generations to come. Since the beginning, intergenerational justice has comprised the ethical core of this term.

Of course, Gro Harlem Brundtland and the other initiators of the modern sustainability discourse have never read Carlowitz, nor are they likely to be familiar with his name. Of much greater significance is the following: since Carlowitz, the word, the body of the verb *nachhalten* (to sustain) has in the general language been charged with meanings that have rendered it a term. These meanings remained intact when during the 19th century the *Nachhaltigkeit* (sustainability) of the German forestry terminology was translated into English as 'sustained forest yield'. The effect of these meanings holds to this very day. Therein lays the historical significance of the 'Sylvicultura Oeconomica'. Carlowitz was the first to link a form of the word *nachhalten* (to sustain) with the notion of providing for the welfare of the present while at the same time catering for the welfare of the future, and so made tangible a reflection upon the present's responsibility for coming generations, bringing into being, coining the term.

How could a term originating from the pre-modern, cameralist thinking of small, enclosed central European territories suddenly and explosively unfold such a brilliant effect in the globalised world of the 20th century? An initial answer: with the earliest photographs depicting the planet viewed from outer space, sent to Earth from the manned moon voyages around 1970, for the first time in its history mankind saw itself entirely from the outside. This was an epochal event. In one instant there was an awareness of man's existence within a 'global village,' that the blue planet represents an enclosed, bounded system: Spaceship Earth. The limits of growth came into view and, as a consequence, the compulsion for self-restraint.

1 Original: *nachhaltende Nutzung*

2 Original: *das Land in seinem Esse nicht bleiben mag*

3 Original: *beständigen, kontinuierlichen und nachhaltenden Nutzung*

Who was Hans Carl von Carlowitz? What was it that made him capable of this great achievement? The portrait featured in this reprint, produced by the Leipzig court engraver Martin Bernigeroth (1670–1733), depicts him as a baroque nobleman. Mounted on a plinth, the portrait medallion reveals the subject's head in a three-quarter profile. The furrows in his brow are deep and vertical. The mouth, with its narrow lips, appears energetic, the expression serious and studious. The dark ringlets of his long French wig fall upon the iron of a decorative suit of armour, over which he has thrown a velvet cape. Wrapped around his neck he wears a light scarf. The family crest rounds off the portrait of an aristocratic, lordly personality. A miniature sun king? Sole ruler in the Saxony silver mining region? Not at all. Those who read his book will encounter a, as they were called at the time, virtuoso; a cosmopolitan, highly educated, nature loving visionary who was guided by a sense of social responsibility for the common good; a man farsighted and with an understanding for the practical.

Carlowitz was born on the 14th of December 1645, at Burg Rabenstein by Chemnitz. His family were of the ancient Electoral Saxony nobility. Follow the family tree backwards and one will notice that over many generations the management of the forests of Saxony's Ore Mountains lay solely in their domain. Hunting, forestry and timber rafting were activities closely linked over the centuries. The secure supply of the mines and smelting works of the Ore Mountains with wood and charcoal were of strategic importance for the economy of Electoral Saxony. Alongside water power, and not to mention the power of human muscle, this resource was the principle source of energy in the extraction, transport and smelting of ore. Over long periods of time, the supply of wood was viewed chiefly as a transport problem. The transport of wood felled in mature stands of the forests cloaking the mountain ridges to the ore mines and the smelting works in the silver towns was primarily the task of those responsible for timber rafting. Carlowitz' own father was the Master of the Hunt to the Elector, the state forest superintendent and the overseer of timber rafting in the Ore Mountains in one. Yet in the decades after the Thirty Years' War the resource crisis surrounding wood became more acute. There was by no means a general shortage of wood in central Europe at the time, but there were severe supply shortfalls regionally. Even this was extremely worrying, however, as at the time wood could only be transported over longer distances via watercourses, by means of rafting. Multiple regional scarcities of wood occurring simultaneously combined to create a general perception of crisis. That which concerned this generation most profoundly was the prediction of a wood shortage; a foreseeable, widespread crisis that would set in within the space of one or two generations, if the devastation of the forests were to continue at a similar rate. Carlowitz later formulated this very precisely in his book. Even in the subtitle he demands that 'the ... great wood shortage

... be pre-empted;⁴ that is, that the resource crisis be anticipated and prevented.

The academic path of the young Carlowitz was apparently carefully mapped out in advance so as to prepare him systematically and purposefully to seek ways out of the impending resource crisis. In spite of the 'then meagre times afflicting our beloved fatherland,' as they were referred to in the funeral sermon held by Freiberg's official sermoniser Hieronymus J. Wäger, Carlowitz' parents had expended 'all diligence and expense' in the upbringing of their son. He received a sterling humanistic school education, which manifested itself in his book of 1713, not least in the frequent references to the Latin classics. In 1659, Carlowitz was "sent to the then famous grammar school in Halle, Saxony". Foremost on the curriculum were the ancient languages Latin, Greek and Hebrew. Then followed logic and elocution, mathematics, history and geography. One of the teachers at the school was the Lutheran theologian Gottfried Olearius, who was also recognised as "a good botanist, musician and astronomer." Church music, choir and prayer naturally also belonged to the daily routine of the pupils at the school.

After five years of grammar school, Carlowitz enrolled in the University of Jena in the summer semester of 1664, where he dedicated himself to "the learning of the laws and matters of state, the study of old and recent history" (Wäger). One year previously, Gottfried Wilhelm Leibniz (1646–1716) from Leipzig, who would later become a renowned philosopher, had also enrolled there. It is not known whether the two men from Saxony, both the same age, ever met there. There were also other opportunities later on; for example, during Leibniz' study trip through the mining areas of the Ore Mountains in February 1688, which was supported by the Inspectorate of Mining. His studies in Jena lasted only two semesters. Subsequently, the twenty year old Carlowitz set off on an extended educational and study voyage that, over the course of five years, took him all across Europe, from Sweden to Malta, London to Venice. "Foreign lands are the best high schools of intelligent representation" (Wäger). The *peregrinatio academica*, also referred to as the 'grand tour' and the 'cavalier's tour,' was obligatory for the sons of princes and nobles in the 17th century. It served not only to broaden the general intellectual horizons of the voyager but equally to deepen their specific expert knowledge. Role models were the *uomo universal*, the *homme du monde*, the *virtuoso*, cosmopolitan, worldly personalities with an all-round education.

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The spectre of a wood shortage was evident throughout Europe, so much so that the problem warranted high political priority. At numerous stations during his years of European education and travel, Carlowitz was able to study the respective attempted solutions – and the corresponding terminology. This European perspective is inscribed in the pages of the 'Sylvicultura Oeconomica.' "In Europe within but a

4 Original: dem ... Grossen Holtz=Mangel... zu prospicieren

few years," he writes (p. 44), "more wood was felled than grew over many ages."⁵ The outcome of this development is easy to foresee. Some time earlier, in the 16th century, Melanchthon had already prophesied a "furious judgement of the great God," whereby "at the end of the world, man will suffer great need for wood."⁶

Carlowitz was in London in the year 1666 as a book by the British landowner, garden designer, art historian and courtier John Evelyn was causing a sensation. The book came into being at the initiative of the newly established Royal Society. Entitled 'Sylva or a Discourse of Forest Trees and the Propagation of Timber', the tome was a passionate plea for an increase in timber, for the reforestation of devastated woods. The concerns in England at the time centred especially on the nation's capacity to build ships, the 'wooden bulwarks of the kingdom,' in other words its navy. John Evelyn viewed Britain's forests as an inexhaustible magazine, but only on the condition they are treated with care. His formula for this was: to manage the woods discreetly. This meant that woods should be managed in accordance with their distinct characteristics, and prudently.

Evelyn sees the propagation of timber principally in providential planting; that is, in artificial regeneration carried out with foresight. Raised in nurseries, then fenced to protect against browsing in the first years after planting, timber should be grown in tree plantations: in straight rows, evenly, geometrically, uniformly. As if in an alley or a park. The greatest utility and the best suitability determine which tree species should be cultivated under the conditions prevailing. Evelyn argues for the cultivation of speedy growing tree species. He is staunch in his belief that the human spirit can impress upon nature a new order, indeed that it is obliged to do so, not least in the interest of the generations to come.

His passionate exhortation, "Let us arise and plant," is underlined by numerous examples of good practice from across Europe. His most emphatic plea—and the guiding theme of his book—is for forethought for posterity, for the coming generations. Each generation, he quotes in Latin, is *non sibi soli natus*, that is, not born for itself alone. Every generation, rather, is born for posterity, for the coming generations. His own contemporaries, he adds dolefully, were apparently *fruges consumere nati*: born to consume the fruits of the Earth. At this point, Evelyn develops the ethic of a foresighted and responsible society: "... men should perpetually be planting, that so posterity might have Trees fit for their service ... which it is impossible they should have, if we thus continue to destroy our Woods, without this providential planting in their stead, and felling what we do cut down with great discretion, and regard to the future."

In his own book, Carlowitz refers to the experiences he gleaned in England (p. 83, 96), yet without referring to John Evelyn by name. Nevertheless, the very title 'Sylvicultura Oeconomica,' when it appeared almost fifty years later, the structure

5 Original: *Binnen wenig Jahren ist in Europa mehr Holtz abgetrieben worden / als in etzlichen seculis erwachsen.*

6 Original: *dass nehmlich am Ende der Welt man an Holtz grosse Noth leiden werde* (p. 50)

of the book, the argumentation and terminology, along with a series of identical examples, suggest that Carlowitz had studied Evelyn's 'Sylva' very closely indeed.

While in France on his *grand tour* in the year 1667, Carlowitz was able to study at close proximity how Jean Baptiste Colbert, the all-powerful minister of the Sun King Louis XIV, advanced his *grande réformation des forêts*. *La France perira faute de bois*. France will perish for a lack of wood. With this jarring alarm call, Colbert set in motion a programme of forest reform in the year 1661. The principal goals: to restore incomes to the state treasury from the royal forests; to quell the fear of impending wood scarcity; to secure sufficient wood supplies for shipbuilding. The overarching idea for the reforms stemmed from the Sun King personally, formulated in a handwritten note: ... *il était nécessaire de faire un bon ménage des bois*—provide for a 'good management' of the forests, fund the state coffers with wood.

This directive is put into effect in the ordinances of 1669. When harvesting a site, seed trees must remain in place. Empty patches, cleared areas and forest openings, are to be reforested through the sowing and the planting of trees. A quarter of every coppice is to be partitioned and reserved for the development of high forest. To reserve (*retenir*) might also be translated into German as *nachhalten* (and into English as to sustain). By virtue of this incidental formulation, the ordinances anticipate the later German coining of the word *nachhaltig* (sustainable). Sustainability ever targets the creation of reserves. One forgoes immediate use in favour of later use, and for the benefit of subsequent consumers. In such instances, the vocabulary of the ordinances has an astonishingly modern feel. Carlowitz himself referred to the French ordinances as a central stimulus, within which "almost the whole entirety of our purpose may be found" (p. 84).

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The key word in the European discourse is conservation. The conservation des bois does not refer to a static preservation of the forests, or to nature 'protection' in the sense of a cessation of use. Rather, it refers to the maintenance of the productivity of the forests, of their ability to regenerate and so also to their capacity to produce wood à perpétuité—perpetually. Conservation means a preserving use. This requires: making the renewal of the resources the measure, the benchmark, indeed the very condition of their use—and not the corresponding needs, the demand. This represents a paradigm shift in man's thinking with regard to resources, a shift that we have not managed to this very day.

Carlowitz employs the term at numerous points in his book. For example, he speaks of the conservation of timber⁷, the conservation of the forests⁸, the conservation of the human being⁹, and even more generally of the conservation of life¹⁰.

7 Original: *Conservation des Holtzes* (p. 97)

8 Original: *Conservation derer Wälder* (p. 83)

9 Original: *Conservation des Menschen*

10 Original: *Conservation des Lebens* (p. 373)

He also speaks of the sustentation and conservation¹¹ of a country, thereby resorting to the Latin root of the word sustainability. The word *conservatio* was not only the key term in the European discourse on the wood scarcity at the time but also an important category of philosophy. The *conservatio sui*, the humane self preservation, was in fact the central project of the early Enlightenment.

One of the pioneers was the Dutch philosopher Baruch Spinoza (1632–1677). His teachings may be read as a philosophical foundation for sustainability. *Sum esse conservare*, the preservation of one's own self, he wrote in his magnum opus 'Ethics', is a natural basic impulse (*conatus*). It is the origin of every desire and so also of economic activity. Ever since his banishment from Paradise, responsibility has lain with man. The economic safeguarding of man's existence can only occur in tune with nature, however. We merely come upon the treasures of nature, we do not manufacture them. Our freedom resides in our harmonising of aspiration and reason, meaning harmony with the order of the entire natural world. Where this succeeds, we can be wholly at peace and in this peace seek to remain. In contrast to Descartes' enthronement of mankind as *maître et possesseur*, master and possessor of nature, Spinoza insists that man is also a part of nature. He does not in this abandon the project of 'humane self assertion,' but rather embeds it in the greater, the ecological context. What does this entail for the constitution of a common good? Reason demands that the preservation of the self is linked not only to the preservation of the natural essentials for life but also to the welfare of others. It is apparent that, by helping one another, people can "provide for themselves much more easily with the things they require, and that only by joining forces can they avoid the dangers that threaten from all sides." Spinoza accentuates the just distribution of goods and the *potentia multitudinis*, the democratic power of the masses, as a contrast to the wolfish laws of free competition. Spinoza appeals for a form of thinking spanning greater periods of time. In his 'Ethics' he wrote that it is necessary to conceive of things "under the aspect of eternity" (*sub specie aeternitatis*). A corresponding imagination, and the capacity to think in very long timeframes, is lacking today—frequently also in the sustainability discourse.

Whether or not Carlowitz was familiar with this notion is an interesting question. Certain passages in the text might suggest that he was. Formulations such as "Nature or rather God the almighty"¹² and "God and Nature"¹³ are, at first glance, reminiscent of Spinoza's pantheistic formula *deus sive natura* (God or Nature). A personality close to the Chief Inspectorate of Mining in Saxony unquestionably cooperated very closely, indeed—as Spinoza was deemed an atheist—acted in conspiracy with the Dutchman, namely Ehrenfried Walther von Tschirnhaus, the co-developer of Meissen porcelain.

11 Original: *sustentation und conservation* (p. 44)

12 Original: *die Natur oder vielmehr Gott der Allmächtige* (p. 25)

13 Original: *Gott und die Natur* (p. 69)

In 1678, Elector of Saxony Johann Georg II named the 33 year old Hans Carl von Carlowitz deputy chief mining officer in Freiberg. His superior was Abraham von Schönberg, the man who ran the 'mining district' with an iron hand and an innovative spirit. It would appear that in all the years up to the time of Schönberg's death in 1711, Carlowitz was little occupied with the operational control of the region's mining and smelting activities. Clearly he had free rein to concentrate on finding a solution to the 'forecast wood scarcity.' He was—as the Freiberg historian Herbert Kaden recently proved—a member of the timber commission established by the Dresden Chamber, occupied with very practical, local problems, yet he studied minutely the pertinent expert literature.

The immediate precursor to *nachhaltig* (sustainable) in the contemporary German literature is *pflöglich*, meaning with care or careful. This word is certainly based on the German equivalent to the Latin *colere* and *cultura*. Carlowitz understood this expression to be an age-old element of the timber terminology, commonly used in these domains¹⁴. He cites the use of this term in the reference work of the cameral sciences of his day, the 'Teutschen Fürstenstaat' (The German Princely State). From the Thuringian duchy Sachsen-Gotha, the author Veit Ludwig von Seckendorff, steered the 'chamber,' the finance authority, at the time. In this small, heavily wooded territory, Duke Ernest the Pious sought to establish a model Lutheran state after the collapse of the state during the Thirty Years' War. He saw himself occupying the role of the good house father¹⁵. His programme was a *reformatio vitae*, a reform of life on the basis of the catechism. In Seckendorff's 'principality' using the woods with care means managing these in such a way that they provide continuous revenue over many years¹⁶. As cited by Carlowitz on p. 87 et seq. the harvest should not exceed the regrowth of timber. Instead the forest should provide steadily, year for year, presently and for always, wood for the use of the [land]lord and a continuous supply of timber for burning and other uses for the people and for posterity¹⁷. Upon this tradition of careful¹⁸ wood use is the argumentation of Carlowitz based. The iron rule against the ruthless exploitation of the woods set down in the 'Sylvicultura Oeconomica' is: That one treats the wood with care¹⁹.

Hans Carl von Carlowitz presented the results of the experiences he gleaned regarding the use of wood during his career, life, travels and research in 1713, in a folio volume in excess of 450 pages in length. The 'Sylvicultura Oeconomica' or

14 Original: *uralter Holz-Terminus, der in hiesigen Landen gebräuchlich*

15 Original: *guten hauß-vaters*

16 Original: *Die gehölzte pflöglich brauchen also zu handhaben, daß solche eine beständige revenüe auf lange jahre geben.*

17 Original: *über den ertrag der höltzer nicht gegriffen, sondern eine immerwährende beständige holtz=nutzung dem Herrn und eine beharrliche feuerung, auch andere holtz=nothdurfft, dem lande, von jahren zu jahren, bey ihrer zeit, und künfftig den nachkommen bleiben*

18 Original: *pflöglicher*

19 Original: *Daß man mit dem Holtz pflöglich umgehe. (p. 87)*

'A guide to the Cultivation of Native Wild Trees' was published by the Leipzig bookseller Johann Friedrich Braun. It saw the light of day in the same year that Johannes Böttger presented the first of his white, transparent Meissen porcelain—possibly at the same Easter trade fair in Leipzig.

The starting point of the book is the resource crisis of the time. The crisis is attributed to the growing population, the earlier onset of industrialisation and the increasing greed evident in society. He criticises the fact that much of the thinking of his time is oriented towards short term monetary gain—to making money²⁰. A cornfield may be harvested annually but one must wait decades in order to obtain wood from the forests, until it is of harvestable dimensions. Even so, the advancing conversion of forest to tillage and pasture is folly (preliminary note). The common man is not inclined to spare the young trees because he senses that he himself will not benefit from their wood. He uses these wastefully, believing them to inexhaustible²¹. Although through the sale of wood it is possible in the short term to make considerable sums of money ... Only where the wood and forests come to ruin do the incomes over endless years fall short, and the royal administrators are overwrought that beneath the same apparent profit lies irreparable damage²². Carlowitz describes the key role of the resource wood and emphasises 'that the wood is essential for the conservation of mankind'²³, as 'no economy ... can dispense with fire or with wood.'²⁴ He advocates, therefore, a bundle of practical measures: a—in modern terms—revolution of efficiency by means of 'wood saving arts'²⁵, for example, improved heat insulation in house construction and the use of energy saving smelting ovens, tiled stoves and kitchen herds (p. 43 et seq.); planned afforestation through the 'sowing and planting of native trees'²⁶; the search for *surrogata*²⁷ for wood, such as turf (p. 425 et seqq.). He recommends the use of fossil energy as a stop-gap solution in times of wood scarcity—in other words, a bridge technology.

But then he developed an overarching idea: that the 'consumption of wood'²⁸ must remain within the boundaries that the 'forest area can produce and bear'²⁹ (preliminary note). With the word 'tragen' (to bear, bearable), Carlowitz comes very close to the modern English word 'sustainable.' That one should use the wood that is as important as the daily bread with circumspection³⁰, so that a 'balance between

20 Original: *Geld lösen* (p. 79)

21 Original: *gehét verschwenderisch damit um / meinet, es könne nicht alle werden* (p. 94)

22 Original: *ziemlich Geld heben... Allein wenn die Holtz und Waldung erst einmal ruinirt / so bleiben auch die Einkünfte auff unendliche Jahre hinaus zurücke / und das Cammer=Wesen wird dadurch gänzlich erschöpft / daß also unter gleichen scheinbaren Profit ein unersetzlicher Schaden liegt* (p. 87)

23 Original: *daß das Holtz zur conservation des Menschen unentbehrlich sey* (p. 372)

24 Original: *keine Wirtschafft ... den Gebrauch des Feuers und des Holtzes entrather*

25 Original: *Holtzsparkünste*

26 Original: *Säen und Pflanzen der wilden Bäume* (p. 49)

27 Original: *Surrogata*

28 Original: *Consumtion des Holtzes*

29 Original: *Wald-Raum / zu zeugen und zu tragen vermag*

30 Original: *mit Behutsamkeit*

establishment and growth and the felling of wood occurs'³¹ and that use can take place 'perennially, continually and perpetually'³². 'Therefore, we should contrive our economy thus and in the direction that we suffer no shortage thereof, and that where it is felled, we must so strive that a new generation may grow again'³³ (p. 98).

Carlowitz illustrates this connection with a proverb: 'Only when one has acquired new clothes should the old be discarded,'³⁴ and continues: 'thus, one should not fell the store of mature trees until one has observed that sufficient regrowth is in place.'³⁵ Sustainable is that which provides for 'regrowth' that which preserves the power of nature to produce, strengthens the capacity to regenerate, allows her time to 'replenish' and protects the natural 'regeneration.'

* * *

It would appear that the author finds neither the traditional word 'careful'³⁶ nor the Latin *conservatio* precise or illustrative enough for this new way of thinking, to express the long term continuity of the use of nature. Let us take a close look at the key moment in his book, where the new term first appears: "But as the lowest part of the Earth has through so much effort and expense revealed its ores, a scarcity of wood and charcoal will necessitate that these are restored again. The greatest artistry, science, diligence and constitution of these domains, therefore, must address how such a conservation and cultivation of wood can be arranged so as to make possible a continuous, constant and *sustaining* use, as this is an indispensable necessity, without which the country cannot maintain its being"³⁷.

Carlowitz first thought here is in relation to the dependence of metallurgy on the energy source wood, and the impending shortage thereof. Then he asks – still using the familiar linguistic pathways – of the conditions for the conservation³⁸ of this resource. He, too, is about the use of wood; a use that is arranged in such a way that wood is harvested but that the woods are 'preserved.' According to Carlowitz, natural regeneration arising from naturally sown³⁹ seed must be supported by artificial regeneration, cultivation⁴⁰; in other words, the sowing and planting of trees. This

31 Original: *eine Gleichheit zwischen An- und Zuwachs und dem Abtrieb des Holtzes erfolget*

32 Original: *immerwährend, kontinuierlich, und perpetuirlich*

33 Original: *Desßwegen sollen wir unsere oeconomie also und dahin einrichten / daß wir keinen Mangel daran leiden / und wo es abgetrieben ist / dahin trachten / wie an dessen Stelle junges wieder wachsen möge*

34 Original: *Man soll keine alte Kleider wegwerffen / bis man neue hat,*

35 Original: *Also soll man den Vorrath an ausgewachsenen Holtz nicht eher abtreiben / bis man siehet / daß dagegen gnugsamer Wiederwachs vorhanden.*

36 Original: *pfléglic*

37 Original: *»Aber da der unterste Theil der Erden sich an Ertzen durch so viel Mühe und Unkosten hat offenbahr machen lassen / da will nun Mangel vorkommen an Holtz und Kohlen (= Holzkohle) dieselbe gut zu machen; Wird derhalben die gößte Kunst / Wissenschaft / Fleiß und Einrichtung hiesiger Lande darinnen beruhen / wie eine sothane (= solche) Conservation und Anbau des Holtzes anzustellen, daß es eine kontinuierliche beständige und n a c h h a l t e n d e Nutzung gebe / weil es eine unentbehrliche Sache ist / ohne welche das Land in seinem Esse nicht bleiben mag« (p. 105 et seq.)*

38 Original: *Conservatio*

39 Original: *Anflug*

40 Original: *Anbau*

refers to the afforestation or reforestation of cleared areas⁴¹ in devastated forests.

The objective of 'conservation'⁴² and 'cultivation'⁴³ is use⁴⁴, but, and this is his message, a long term, enduring use. To emphasise this aspect, and to further refine it, Carlowitz now strings together three closely related temporal clauses: 'continuous'⁴⁵, borrowed from Latin, to signify the regularity and permanence of the processes; the attribute 'constant'⁴⁶, which combines the implication of limitlessness in time with a locally defined stability; and finally 'sustaining'⁴⁷. With this word, the notion of duration over time and of stability (from the German *nachhalten*: to continue to 'hold' (*halten*) 'after' (*nach*) a defined point in time suggests, through a perception of division (to sustain or to have something available, and so economising) and retaining for later, the thrifty, economising use of limited resources.

A further meaning that also resonates in this word is the idea of trusteeship. *Thotrower handt naholden* (in faithful hands retained) was a firmly established expression in the German language of law in the late Middle Ages. It was a reference to preserving and stewarding in trust something for someone else for a later time. Here already the word *nachhalten* (*naholden* in the German of the late Middle Ages) appears as a practice of providing for the future. The 'gravity' of this excerpt is underlined by the subsequent causal clause: without the resource wood, and its 'sustaining use,'⁴⁸ '... the country cannot maintain its being'⁴⁹. Already at this time we see the perception of sustainability as the counterpoint to collapse, that which makes this term so topical in the 21st century.

What is notable, as highlighted by the specialist in German studies Uwe Pörksen, is the consistently verbal form of expression that Carlowitz uses as this juncture. Even his nouns are descriptions of actions. 'Conservation,'⁵⁰ like 'cultivation'⁵¹ and 'use,'⁵² refers to the corresponding action; conserving, cultivating, using. The existence of the country ultimately is expressed using the nominalised verb form *esse* (being) as a consummatory process. Even the adjectives are based on actions (continuing, existing, sustaining).

The present participle form 'sustaining'⁵³ signals an active process. It refers to an action (namely a specific manner and means of use), which through its specific course intends, and in fact actually effects, that something is preserved. The verbal expression brings the action and the systemic thinking to the fore. "If we ask,"

41 Original: *Blößen*

42 Original: *Conservation*

43 Original: *Anbau*

44 Original: *Nutzung*

45 Original: *continuïrlich*

46 Original: *beständig*

47 Original: *nachhaltend*

48 Original: *nachhaltende Nutzung*

49 Original: *das Land in seinem Esse nicht bleiben*

50 Original: *Conservation*

51 Original: *Anbau*

52 Original: *Nutzung*

53 Original: *nachhaltend*

according to Uwe Pörksen, “whether an action is sustaining, or has the effect, the entire milieu begins to vibrate and reveals its participation ... The verbal expression compels action and systemic thinking.” This point in the ‘*Sylvicultura Oeconomica*’ contains the founding text of our term sustainability. Though Carlowitz uses the word once more in the next chapter, while speaking of the ‘timber store,’⁵⁴ which will ‘sustain,’⁵⁵ he does so without particular emphasis, certainly without any definition, which, for good reasons, we still refrain from doing to this very day. Yet the word appears in a specific context (sustaining use⁵⁶) and, above all, with a complex semantic coinage, and with a substance, that corresponds to the core of our modern term.

* * *

The ‘*Sylvicultura Oeconomica*’ contains not only the body of the word in its current meaning. Crucially, it is in this context that the ‘triangle of sustainability’ appears, embryonically, but with clear contours. This combined contemplation of ecology, economy and social justice is fundamental to today’s theory of sustainability.

How does Carlowitz speak of nature? She is ‘bounteous.’⁵⁷ It is a ‘benevolent nature.’⁵⁸ *Mater natura*—Mother Nature. Carlowitz speaks of the *constantia naturae*⁵⁹, of the ‘wonder of vegetation,’⁶⁰ of the ‘life-giving power of the sun,’⁶¹ of the ‘awe-worthy nourishing life spirit’ (p. 22) the earthly realm contains, ‘the wondrous and nourishing life force’⁶² within the soil. The plant is *corpus animatum* ... ‘a living body ... that grows from the soil, takes from it its nourishment, grows and multiplies.’⁶³ The *outer appearance*⁶⁴ of trees is intrinsically linked to the ‘inner form, signature, constellation of the sky under which they green.’⁶⁵ Nature is ‘unspeakably beautiful. She is never to be comprehended.’⁶⁶ She ‘keeps much hidden from man.’⁶⁷ Yet even so, we may read in the book of nature and, through experiment, uncover ‘how nature plays and contemplate the mysterious marvels of nature.’⁶⁸

Unquestionably, in such formulations does Carlowitz’ contemplation of nature achieve a depth that has largely been lost from today’s discourse on ecology and sustainability. Let us take the—seemingly—simple observation that renewa-

54 Original: *Holtz=Vorrath*

55 Original: *nachhalten* (p. 113)

56 Original: *nachhaltende Nutzung*

57 Original: *milde* (p. 91)

58 Original: *gütige Natur* (p. 113)

59 Original: *constantia naturae* (p. 60)

60 Original: *Wunder der Vegetation*

61 Original: *lebendig machenden Krafft der Sonnen* (p. 24)

62 Original: *wundernswürdigen ernährenden Lebens=Geist*

63 Original: *corpus animatum ... ein belebter Körper ... welcher aus der Erden aufwächset / von selbiger seine Nahrung an sich zeucht, sich vergrößert und vermehret* (p. 23)

64 Original: *äußerliche Gestalt*

65 Original: *innerlichen Form, Signatur, Constellation des Himmels / darunter die grünen* (p. 21)

66 Original: *unsagbar schön. Sie ist nimmermehr zu ergründen* (p. 31)

67 Original: *hält den Menschen noch viele Dinge verborgen* (p. 39)

68 Original: *wie die Natur spielt und der sonderbaren Wunder-Wercke der Natur nachdenken* (p. 39)

ble resources are 'living' resources. Living entities. Today, by contrast, we talk of 'biomass'. This expression is a grand leveller, all differences are evened out and unlimited availability is suggested. In contrast to mineral and fossil resources, however, renewable resources depend on an intact environment. They do not grow everywhere, and at all times. For photosynthesis they require the sun for energy, for growth and propagation they rely on the fertility of the soil and many other factors. Carlowitz discusses the great ecological interactions. They are characterised also by another dimension, an aesthetic, even spiritual, dimension.

How is the economic thinking conceived? The starting point is a simple observation: man no longer finds himself in the Garden of Eden. Carlowitz cites that part of the story of creation contained in the Old Testament that, still to this day, is called upon as a formula for sustainability: the decree to build upon and preserve of the Earth (Moses 1:1, 2, 15). It serves him as a biblical justification for a morally based economics (p. 104).

Yet, ever since his banishment from Paradise, 'man may not leave everything to nature.'⁶⁹ He may not rely on nature to provide a perpetual bounty. Rather, he 'must lend a helping hand to the vegetation of the Earth'⁷⁰ (preliminary note) and apply both 'his reason and his hands.'⁷¹ In so doing, he may never act contrary to nature⁷², however (p. 39), rather he must always act with her⁷³. The notion of an economy in accordance with nature varies at many points in the book: 'Thus one should ... replicate nature, as the latter best knows that which is useful, necessary and profitable'⁷⁴. This reveals an understanding of the embedding of human economy in the natural order that the theoreticians of today's 'green economy' only seldom attain.

But just what does Carlowitz mean by economy? The word is even contained in the Latin title of the book: 'Sylvicultura Oeconomica'. An appropriate translation of the title might be 'thrifty silviculture or forest culture'. The idea of *haushalten* (preliminary note), in English literally housekeeping or husbanding, that is, the economical and efficient handling of resources, is central. Obtaining from a minimum of resources a maximum effect is the objective of the economy and of management (preliminary note), the aim of resource management. The guiding principle is the housekeeping of the knowledgeable pater familias⁷⁵—also in the pursuit of manufacturing, mining and the running of businesses. It is certainly not an expansive growth economy fixated on making money⁷⁶. Carlowitz expressly rejects any strat-

69 Original: *nicht alles der Natur ... alleine überlassen* (p. 113)

70 Original: *vegetation der Erden hierunter zur Hülffe kommen*

71 Original: *Verstand und Hand mit anlegen* (p. 113)

72 Original: *wider die Natur handeln*

73 Original: *mit ihr agiren* (p. 31)

74 Original: *Also soll man ... der Natur nach ahmen / weil selbige am besten weiß / was nützlich / nöthig und profitabel dabey ist.*

75 Original: *verständigen Hauß=Vaters* (p. 77)

76 Original: *Geld heben*

egy whereby a country acquires its own needs from other domains⁷⁷ or even seeks to render foreign provinces subservient⁷⁸. A rejection of colonialism! This at a time when the ruling elites of the western European nations undertook, through colonial conquest, to overcome the resource crisis once and for all.

Carlowitz formulated social-ethical principles in keeping with his ecological and economic thinking: all are entitled to ample nourishment and sustenance⁷⁹, also the poor subjects⁸⁰ and the dear posterity⁸¹ (dedication). This refers in the first instance to the *Nothdurfft*, referred to in the modern sustainability discourse as basic needs. But Carlowitz also envisages development. In the dedication to his monarch, King Augustus II the Strong, he speaks of the goal of increasing trade and change⁸². He speaks of raising⁸³ the country, that is, the advancement of the common welfare of the land⁸⁴ or—using an old metaphor—of the *Flor* (p. 49), the blossom of the land. At all times this refers to the best of the common being⁸⁵ (dedication), the well being of the entire community. First and foremost in the minds of Carlowitz and his contemporaries was not the increase of material wealth. At one point he speaks of bliss (p. 94). This was a central value in the discourse of the day. Spinoza sought beatitude⁸⁶ and Leibniz the creation of bliss in the human species⁸⁷. The focus is always the claim to happiness in this world, as distinct from ‘blissfulness’ in the afterlife. It corresponds roughly to what we refer to today as quality of life.

Meeting the needs of the living generations in the present, and also into the future, inseparably linked to the welfare of future generations, our descendants, dear posterity. In this three hundred year old book we find variations on the theme at different points. Here, too, there is a profundity that we today have lost. Carlowitz mentions the dear posterity. This refers to a hard and fast formula that seeks to express a particularly intimate relationship and a responsibility that stretches into the future. This formula is not in any way limited to the progeny of a princely or noble family. A proof of this: In his novel ‘Simplizissimus’, so the author Hans Jacob Christoffel von Grimmelshausen (1622–1676), he sought to report to the dear posterity⁸⁸ the cruelties committed during the Thirty Years’ War.

Manifest in Carlowitzian forward thinking is the ethical principle that permeates the term sustainability from the founding texts right up to this very day: assume responsibility for the future.

77 Original: *Land sich seiner Nothdurfft von andern Orten holt* (p. 94)

78 Original: *fremde Provinzen sich unterwürffig machen will* (p. 97)

79 Original: *Sattsame Nahrung und Unterhalt*

80 Original: *armen Unterthanen*

81 Original: *lieben Posterität*

82 Original: *den Handel und Wandel zu erheben*

83 Original: *Auffnehmen*

84 Original: *der Beförderung der allgemeinen Landes=Wohlfarth*

85 Original: *Beste des gemeinen Wesens*

86 Original: *beatitudo*

87 Original: *Glückseeligmachung des menschlichen Geschlechts*

88 Original: *der lieben Posterität*

* * *

The word *nachhalten* (to sustain) arises in his book only twice more. On page 113 it refers to the timber supply, which will 'sustain well.' Finally, in the chapter concerning the making of charcoal, Carlowitz reports on the 'gypsies'⁸⁹ in Egypt and Hungary who "also position their smelting works in open fields and who, to this end, carry with them small ovens and implements, outlandish yet good science they possess, to burn good charcoal sustaining so long, and in fire longer, than other coal. The iron, too, is supposedly hardened splendidly ..." ⁹⁰. A small, touching tribute made by one virtuoso to other virtuosi. A fear of contact with other cultures of the world was unknown to the Saxony nobleman.

* * *

Hans Carl von Carlowitz died in Freiberg on the 3rd of March 1714. His book remained current. A second edition, published by the Saxony cameralist Julius Bernhard Rohr, saw the light of day in 1732.

In the first decades of the 18th century, the 'Sylvicultura Oeconomica' was compulsory reading for the cameralists in the small German states and beyond. It was studied in the 'Economic Society' of the Canton Bern as it was in the Lutheran vicarages in Finland, then a part of the Swedish empire. Carlowitz' word *nachhaltend* (sustainable) gradually consolidated itself as a clearly bounded term. Over time the root word was joined with the suffix -ig and modified to *nachhaltig*.

An early proof can be found in a document from the chamber of the Duchy of Saxony-Weimar. In the 'Fürstlich-Sächsisch-Weimarischen Forstlagerbuch' of 1729, the author, Master of the Hunt of the Weimar Uplands Hermann Friedrich von Göchhausen (1663–1733), enquires how wood can "in the future be used carefully and sustainably (*nachhaltig*), and what its annual yield may be".⁹¹ Three decades later, Saxony-Weimar became the first experimental site for a form of forestry explicitly adhering to the new concept. In the year 1760, to halt the continued overexploitation of the forests, the Weimar foresters demanded a thorough assessment of the forests by a commission of experts. Subsequently, the 23 year old regent, Anna Amalia, signed an edict calling for a comprehensive inventory and for planning measures for the ducal forests: they are to be "geometrically surveyed, described and prescribed a new and sustainable forest management plan based on the correct fundamentals of forestry".⁹² This is the first example of expansive forest management planning in history! Working in this tradition was the Thuringian

89 Original: *Zigäunern*

90 Original: *die das Schmiedewerck auch wohl in freyen Felde treiben und zu dem Ende kleine Oefen und Geräte mit sich herum führen / absonderlich aber gute Wissenschaftten haben / guten Kohl (= Holzkohle) zu brennen / so lange nach hält / und in Feuer mehr / als anderer Kohl dauert. Das Eisen sollen sie auch vortrefflich wohl härten können ...* (p. 394)

91 Original: *künfftighin pfleglich und nachhaltig zu gebrauchen und was dessen jährlicher Ertrag seyn könne.*

92 Original: *geometrisch ausgemessen, forstmäßig beschrieben werden und eine auf richtigen Grundsätzen der Forstwissenschaft festgesetzte neue und nachhaltige Forsteinrichtung*

forester Heinrich Cotta (1763–1844). Along with contemporaries such as Georg Ludwig Hartwig (1764–1837) and Gottlob König (1776–1849), he further developed the forestry term sustainability systematically, operationalised it and made it the basis of a science. “The forest science,” wrote Cotta in 1817, “teaches that the forests should be treated such that they offer up the greatest use sustainably.”⁹³ By that time Cotta was already active in the service of the state Saxony, where he directed a comprehensive forest management planning scheme. In 1817 he founded the ‘Königlich Sächsische Forstakademie zu Tharandt’ (the Royal Saxony Forest Academy in Tharandt), which quickly drew students from across Europe.

Graduates of the Tharandt Forest Academy (and the other German forest academies) played a significant role in exporting the German term throughout the rest of the world. This gave rise to the need for a translation. Both in French and in English, derivations of the Latin verb *sustinere* were resorted to. In Nancy, where Cotta’s student Adolphe Parade (1802–1864) established the French forestry ‘*école supérieure*’ in 1824, they referred to the ‘*principe du rendement soutenu*.’ The German foresters Dietrich Brandis (1824–1907) and Wilhelm Schlich (1840–1925), who from 1864 were active in the service of the British colonial administration in transferring the European model to the forests of India, translated the word analogously: “To give a sustained yield of produce in the future,” as quoted from the monumental reference work ‘*Schlich’s Manual of Forestry*,’ is the primary objective of forest management.

With the concepts *nachhaltiger Ertrag*, *rendement soutenu* and ‘sustained yield’, the idea and the term coined in the realm of sustainable forestry entered into the language of the newly established United Nations in 1951. In this year the FAO, the Food and Agriculture Organisation of the UN, formulated its ‘Principles of Forest Policy’ on the basis of this concept. It was another thirty years before the internationally recognised forestry term was to serve as the blueprint for the universal concept of ‘sustainable development’.

The term *Nachhaltigkeit*, and sustainability, one might say, is a gift of the German language to the globalised world of the 21st century. The word contains everything of import. It possesses the necessary gravity, the existential perspective of a comprehensive service for the public. It has the prerequisite elasticity, the capacity to adapt this substance to the respective specific circumstances. Thus, it becomes a compass for the exploration of an unknown terrain: the future.

* * *

Why, in the year 2013, should we take notice of Carlowitz and his three hundred year old book, and indeed read it?

In the 6th century prior to the start of the Common Era, in response to the ques-

⁹³ Original: *Die Forstwissenschaft lehrt die Waldungen so zu behandeln, daß sie als solche den größten Nutzen nachhaltig gewähren.*

tion of what he would do if the emperor were to entrust to him the governing of the state, the Chinese philosopher Confucius answered: “By all means rectify terms.” ‘Zheng Ming’—the correction of names or terms—remains at the heart of Chinese philosophy to this very day.

The undertaking of such a task with respect to the term, a new care in the use thereof, would appear to be especially necessary in the case of sustainability. Everyone is talking about sustainability. And that is as it should be. As a consequence of this, however, the concept has been usurped by advertising speak and the language of political propaganda. In a world where everything is sustainable, nothing is sustainable any more. This carelessness renders our terminology, and the corresponding concepts, null and void. Has the word already been worn out? Now, at a time when we so badly need it? When it is ‘the key to human survival?’ Can we dispense with it? Do we have an equivalent substitute? A different word with the same scope of meaning, with the same gravity and flexibility? The alternative to a very precarious abandonment of the term is to counter its insidious enucleation by searching for its core. This quest leads us to the history of the term—and to Carlowitz. At the beginning of the creation of a term, the elementary aspects are always considered. In the process, the substance is developed, which later enfolds its potential, but which in the operationalisation and implementation may become blurred. In this sense, the ‘*Sylvicultura Oeconomica*’ still has a role to play today: as a source, in which we can reflect and assess our use of the word—and, in so doing, rediscover its majesty. And so the discovery of sustainability goes on.

Further reading: Ulrich Grober, *Sustainability – A cultural history*. Translated by Ray Cunningham, Green Books, Totnes, UK, 2012.