

The great transformation and the questions

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Chapter 2

The Great Transformation and the Questions



Jan-Pieter Smits and Harry Lintsen

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Abstract This chapter opens with an overview of Dutch society midway through the nineteenth century, showing that at the time poverty was the main social problem. This is followed by a comparison between the benchmark years 1850 and 2010. The comparison shows that over the course of the intervening 160 years, Dutch society realised a vast increase in well-being. Extreme poverty was gradually eliminated, though in so doing sustainability issues emerged. Economic modernisation made inordinate demands on natural capital. After 1960, in particular, economic growth had an increasingly negative impact on human well-being and on sustainability.

Keywords Poverty · Well-being · Sustainability · Natural capital

This chapter is written by Jan-Pieter Smits and Harry Lintsen with contributions by Fred Lambert.

2.1 A Landscape of Horrors¹

In 1845, for the first time in history, the potato harvest failed nearly everywhere in Europe. The Netherlands were not spared.² In the hot and moist summer of that year the mold *Phytophthora Infestans* had spread unusually quickly. The leaves of the potato plant were infested first, after which the underground tuber quickly began to rot. Farmers looked on, astonished. This they had never seen before. The consequences were catastrophic. Since the eighteenth century the potato had been a staple of the popular diet. Potato prices skyrocketed in response to the extreme scarcity and prices of wheat and bread soared with them. There was widespread hunger. The population grew restless and Leiden, Delft, The Hague and Haarlem were the scene of food riots.³ The police were powerless against mobs, rowdiness, vandalism and sometimes plunder. Grocers who were suspected of profiteering were especially targeted. The army had to be called in to restore order. The situation deteriorated with the failure of the rye harvest in 1846.

This was only the beginning of a war of attrition. The Netherlands was being lashed by a variety of scourges. Many lost the gamble with death. In the summer of 1846 typhus and typhoid fever, among others, reared their ugly heads. By the end of August a malaria epidemic had developed. The sick barely had time to recover due to the cold winter that followed. Bronchitis and flu became epidemic, in many cases ending in death. In subsequent months malaria returned and, abetted by dysentery, measles and associated ills, decimated the population. ‘... The sick are extremely weakened by the repeated fevers,’ as Amsterdam’s Medical Commission noted:

at every illness, even without accompanying fevers, all the sufferers experienced an almost instantaneous loss of vitality and even the healthy complained of a certain degree of sluggishness and apathy. The apathy and exhaustion...were...the precursors and harbingers of the tremendous storm that was about to break... namely the widely feared *Cholera Asiatica*.⁴

The cholera epidemic broke out halfway through 1848 and reached its peak in 1849. After that the Netherlands was able to lick its wounds, but not for long. New dramas followed. 1853 witnessed the start of the Crimean War, a struggle between the Russian Empire and an alliance of among others Turkey, France and England. Its effects were felt, even though the war, that lasted two years, took place at a distance of more than 2000 km. It drove international wheat prices up and seriously depressed

¹The introduction is based on: H. Lintsen et al., *Made in Holland. Een techniekgeschiedenis van Nederland [1800–2000]* (Zutphen 2005), 23.

²J. Bieleman, *Geschiedenis van de landbouw in Nederland 1500–1950* (Amsterdam 1992), 132–133.

³R. van der Wal, *Of geweld zal worden gebruikt. Militaire bijstand bij de handhaving en het herstel van de openbare orde 1840–1920* (Hilversum 2003), 57–66.

⁴Quoted in: J.M.M. de Meere, *Economische ontwikkeling en levensstandaard in Nederland gedurende de eerste helft van de negentiende eeuw* (‘s-Gravenhage 1982), 112.

Dutch wheat imports. Access to food in those years was at least as problematic as during the potato crisis.⁵

In March 1855 the Grebbe Dike was breached over a length of 150 meters. The Land of Maas and Waal and the Gelderland Valley were flooded. Other parts of Gelderland and North Brabant followed. Water and ice floes caused great damage.

Severe floods and dikes have covered parts of our fatherland with disasters and have cast thousands of our countrymen, robbed of all property and goods, into frightful misery. Every single source of life has ceased to flow, there where water covers the otherwise so fertile fields...⁶

The king visited the affected region. The Dutch opened their purses to the victims. Fund-raising events were organized.⁷

Around 1850 the Netherlands experienced bad times. There was hunger. Illness reigned everywhere. The death rate increased and life expectancy declined. The social order was under duress and criminality increased. In the region of the big rivers and along the coast floodwaters had to be kept at bay.

Is this the background against which we have to paint a picture of well-being and sustainability in the Netherlands since 1850? Further analysis demands the specification of an initial situation. This consists in the first place of a brief characterization of Dutch society.

In the second place, we want to confront the situation at that time with the situation now. We tackle this with the Monitor from the previous chapter. The three ‘dashboards’ with indicators serve as points of departure. (1) well-being in the Netherlands ‘here and now,’ (2) resources available for future generations, ‘later’ and (3) the Netherlands in the world, ‘elsewhere’. We fill in the ‘dashboards’ with a series of numbers for the various indicators pertaining to diverse themes. The starting period of the investigation (the middle of the nineteenth century) can thereby be contrasted with the present day. This exercise should be seen as a preliminary exploration. What do the numbers say?

In the third place we provide an impression of the development of natural capital between 1850 and 2010.

As might be expected, the conclusion is that we can speak of a Great Transformation. It is almost impossible to imagine how fundamentally the Netherlands has changed. This chapter provides a characterization and poses fundamental questions raised by the transformation.

⁵M.T. Knibbe, ‘De hoofdelijke beschikbaarheid van voedsel en de levensstandaard in Nederland, 1807–1913’, *Tijdschrift voor Sociaal-Economische Geschiedenis* 4(2007), nr. 4, 98.

⁶‘Watersnood’, *Nieuwe Rotterdamsche Courant*, 11-03-1855.

⁷See the numerous advertisements in the newspapers in that year. Source: Delpher Kranten, keyword ‘watersnood’ (flooding).

2.2 The Netherlands Around 1850

The historical literature provides a mixed image of Dutch society halfway through the nineteenth century. On the one hand it is evident that in this period the Netherlands is highly developed. Per capita income is among the highest in the world. Moneywise, the Netherlands remained the world's richest country until about 1800. After that, Great Britain, where the industrial revolution raged in the first half of the nineteenth century, took the lead from the Netherlands.⁸

The high level of economic development is also reflected in a number of structural features of Dutch society in this period. The degree of urbanization, amounting to 21% in 1850, was one of the highest in the world.⁹ European countries with levels of income similar to the Netherlands hovered around only 6%.¹⁰ This high level of urbanization was made possible to a large degree by the high productivity of Dutch cattle husbandry in particular. This freed an important part of the agricultural labor force to find work in trade, transport and services in the strongly commercialized economies of the coastal provinces.¹¹ Finally we can point to the high level of literacy, often ascribed to the Protestant church that of course attached great importance to the ability of believers to read the bible themselves.

Nonetheless, in the first half of the nineteenth century this high level of economic development also had its dark sides.¹² The province of North Holland for example, traditionally one of the most prosperous regions of the country, suffered from deurbanization. Especially in the cities around the Zuiderzee, employment declined to the extent of encouraging a sizeable migration to the countryside. Data on consumption also show that material well-being was threatened. Consumption of meat exhibited a significant drop, which is taken in the literature to be a sign of strong social-economic decline. Finally, we can point to the state of government finances. At the outset of the 1840s this was in a deplorable condition. In 1844 'bankruptcy' of the Dutch state could barely be prevented.¹³

This is a diffuse image. The Netherlands exhibits aspects of a highly developed society, while at the same time there are indications of stagnating social development. How can this be understood? Richard Griffiths asked this questions years ago in a publication entitled *Achterlijk, achter of anders? (Backward, behind or*

⁸A. Maddison, *Monitoring the world economy* (Parijs 1995), 23. For updates of this database see: <http://www.ggdc.net/maddison/maddison-project/data.htm>

⁹J. de Vries, *European urbanization 1500–1800* (London 1984).

¹⁰A. Burger, 'Dutch patterns of development: economic growth and structural change in the Netherlands', *Economic and social history in the Netherlands* 7 (1996), 109–132.

¹¹For an elaborate analysis of the commercialization of the agrarian sector during the Dutch Republic see: J. de Vries, *The rural Dutch economy in the golden age, 1500–1700* (New Haven 1974).

¹²De Meere, *Economische ontwikkeling en levensstandaard*.

¹³J.T. Buys, *De Nederlandsche staatsschuld* (Haarlem 1857), 149–158; I.J. Brugmans, *Paardenkracht en mensenmacht* (Den Haag 1961), 187.

different?).¹⁴ In certain respects the nineteenth century Dutch economy certainly lagged behind. The process of industrialization that was so successful in Great Britain and Belgium barely took off in the Netherlands. But ‘backward’ is certainly not a justifiable qualification in view of a number of ‘modern’ characteristics of Dutch society sketched above.

The key to the paradox can be found in the ‘different’ nature of Dutch society. Throughout the first half of the nineteenth century the Netherlands found itself in the middle of a far-reaching structural transformation, framed in the literature as the transition from a commercial capitalistic to an industrial capitalistic system.¹⁵ During the Dutch so-called Golden Age (1580–1672) the Netherlands witnessed an economic dynamism unknown in those days. Amsterdam’s staple market became one of the most prominent centers of world trade, around which countless processing industries and a flourishing financial and transport sector developed.¹⁶ Around 1650 material well-being had climbed to such heights that per capita income was the highest in the world. This exceeded that of Great Britain by no less than 30%.¹⁷

The tide turned in the eighteenth century. The Republic’s economy declined into a ‘stationary state’ and all but ceased growing.¹⁸ This can in part be attributed to external factors. The currents of world trade shifted, threatening the functioning of Amsterdam’s central staple market.¹⁹ But this is not the whole story. Economic dynamism gradually disappeared and the obsolete institutional system hindered the emergence of new entrepreneurial initiatives. In the eighteenth century economic and institutional rigor mortis assumed such proportions that the literature speaks of an ‘obsolete economy.’²⁰

The greatest obstacle to innovation was the political and economic elite of the Republic, that clung to its privileges and sources of income and that consciously resisted new and potentially more profitable economic activities as a threat to their vested interests. Halfway through the nineteenth century the Netherlands was forced to eat the bitter fruits of this shortsighted attitude.²¹ Certainly, in a number of respects one could always point to a positive inheritance from the period of the Republic (high income levels, robust level of commercialization) but the institutional

¹⁴R.T. Griffiths, *Achterlijk, achter of anders? Aspecten van de economische ontwikkeling van Nederland in de 19^e eeuw* (Amsterdam 1980).

¹⁵J.L. van Zanden, *Arbeid tijdens het handelskapitalisme. Opkomst en neergang van de Hollandse economie 1350–1850* (Bergen 1991).

¹⁶T.P. van der Kooij, *Hollands stapelmarkt en haar verval* (Amsterdam 1931).

¹⁷Zie hiervoor: <http://www.ggdc.net/maddison/maddison-project/data.htm>

¹⁸J.L. van Zanden, ‘The Dutch economy in the very long run. Growth in production, energy consumption and capital in Holland (1500–1805) and the Netherlands (1805–1910)’, in: A. Szirmai, B. van Ark en D. Pilat, red., *Explaining economic growth. Essays in honour of Angus Maddison* (Amsterdam 1993), 267–283.

¹⁹Joh. De Vries, *De economische achteruitgang van de Republiek in de achttiende eeuw* (Leiden 1959).

²⁰J. de Vries, ‘Barges and capitalism’, *AAG Bijdragen* 21 (1978).

²¹J.L. van Zanden and A. van Riel, *Nederland 1780–1914. Staat, instituties en economische ontwikkeling* (Amsterdam 2000), chapters I.3 en 2.4.

system functioned as a brake on social renewal. On the one hand the old commercial capitalist system no longer generated sufficient growth and employment, and on the other hand the institutions hindered the modernization of social life.

There was also a large income differential. While the per capita income might have been very impressive by international standards, the bulk of this income was pocketed by the political and economic elite, especially the merchants of the province of Holland. A large part of the population lived in poverty. This poverty was exacerbated by the tax system. Tax burdens were distributed quite unevenly across the population and lay especially heavy on workers' families.²²

In the course of the second half of the nineteenth century the obstacles to economic renewal were gradually eliminated. From the 1860s on the Netherlands experienced a successful transformation from a pre-modern commercial capitalistic to a modern industrial capitalistic structure. What did this transformation bring to the Netherlands in terms of well-being and sustainability? This is the central issue of this book. For a first assessment we compare the situation in the middle of the nineteenth century with the present-day situation and take the CBS monitor as our point of departure..²³

²²E. Horlings and J.P. Smits, 'Private consumer expenditure in the Netherlands, 1800–1913', *Economic and social history in the Netherlands* 7 (1996), 15–40.

²³The CBS measurement framework relies on about 100 indicators, this study, in accord with international usage, employs a so-called 'small indicator set.' The choice of the themes is justified in part II of the *CES Recommendations on Sustainable Development* (New York/Geneva 2014). We have of course tried when choosing indicators to follow these recommendations as closely as possible. Sometimes however, lacking sufficient data, we had to make use of 'proxies' that could be considered an adequate measure of the given theme. The following differences with the *CES Recommendations on Sustainable Development* (New York and Geneva 2014) should be noted:

- Obesity as indicator for nutrition is replaced by height.
- The bird index as indicator for biodiversity is replaced by 'Mean Species Abundance' (MSA)
- Fine dust as indicator for air quality is replaced by SO₂.

In a number of cases, due to the availability of sources or because of the representation of the historical theme, indicators had to be defined slightly differently than in the measurement system. For example, 'attendance at elections' as an indicator for political institutions has been replaced by the 'democracy index'. In the recommendations population size is used as a general indicator for the context. That is how it is used in this study.

The values of the indicators for the reference dates 1850, 1910, 1970 and 2010 come from the following sources:

- J.L. van Zanden et al. (red.), *How was life? Global well-being since 1820* (OECD Publishing 2014): general income inequality, life expectancy, height, murder victims, level of education, MSA, democracy-index.
- F. Lambert, *Massastromen in Nederland. In de jaren 1850, 1913, 1970, 2010* (researchreport Eindhoven University of Technology, oktober 2016): gross domestic consumption non-fossil raw materials, import of raw materials.
- H. Hölsgens, *Energy transitions in the Netherlands: Sustainability challenges in a historical and comparative perspective* (Groningen 2016), appendix VIII: CO₂.
- K. Breedveld, M. Cloin en A. van den Broek, *Ruimte voor tijd. Op weg naar een monitor tijdsordening* (Sociaal en Cultureel Planbureau, Den Haag 2002): free time
- J.P. Smits, E. Horlings en J.L. van Zanden, *Dutch GNP and its components, 1800–1913*

2.3 Well-being ‘Here and Now’: 1850 Versus 2010

Well-being ‘here and now’ is the monitor’s first dashboard and includes a broad palette of themes, among which well-being, labor, air quality and trust in institutions. Quite in line with expectations, material well-being – measured as per capita consumption – increased in the period 1850–2010 (Table 2.1). In fact it grew by a factor of almost six, while the Dutch population increased from 3.1 million to about 16.6 million inhabitants.

Well-being also increased in a broader sense. The average life expectancy, an indicator of health and the physical condition of the Dutch population, was 37 years in 1850. That is less than half the present life expectancy. The nutritional and housing situations are also much improved. The number of years of schooling, at present an important factor in personal development and economic life-chances has increased by eight years on average. An indication of political participation is the democracy index, for which 100% denotes the theoretical maximum.²⁴ In the 1840s this was 0.31% and at present 39%. By today’s standards the quality of life in 1850 as measured by these indicators must be judged to be low or very low. Well-being in terms of satisfaction with life cannot be measured for 1850. It is, however, hardly a daring supposition that the well-being of the Dutch has increased.²⁵

In several respects the years around 1850 distinguished themselves in a positive sense. The number of murders per 100,000 inhabitants, a measure of personal safety, was low (0.8), even lower than at present in the Netherlands (1.1). Also, the quality of the natural environment was high. Biodiversity, for example – expressed in ‘Mean Species Abundance’ (MSA) – where 100% represents the original pre-human

(Groningen 2000): unemployment in 1850 and 1910

- Centraal Bureau voor de Statistiek (CBS), among others Statlines: the values of the other indicators.
- For statistical substantiation of the values of the indicators, see the relevant sources.

²⁴The democracy index is defined as the product of the participation index (the percentage of the adult population that votes in elections) and the competition index (one minus the proportion of the vote going to the winning party in national elections). J.L. van Zanden et al. (eds.), *How was life? Global well-being since 1820* (OECD Publishing 2014), 163.

²⁵An indication could be a comparison between the Netherlands at that time and present-day countries with the same level of material well-being. Then it cannot be otherwise than that the Dutch must have been unsatisfied or dissatisfied with their lives. In 1850 the Netherlands had a gdp/capita of 2330\$ (1990 PPP\$). From the *Human Development Report* (2010, table 1, 143–145) we select the first country with a gdp/capita below 2350\$ (2008 PPP\$). That turns out to be Kyrgyzia with a satisfaction score of 6. Subsequently the lowest country with a gdp/capita above 2300\$. That turns out to be Yemen with a satisfaction score of 4. In this table the Netherlands occupies seventh place with a score of 9. All scores are rounded off.

One could also imagine that the Dutch may have felt themselves relatively happier than the inhabitants of other countries. After all, the Netherlands was among the richest countries in the world.

The problem was that means of communication were limited and most Dutchmen were not acquainted with the situation elsewhere. They were familiar with their own situation where there was a huge gap between rich and poor. Poverty and inequality have a big impact on well-being.

Table 2.1 Dashboard well-being 'here and now,' 1850 versus 2010

Theme	Indicator	Unit	±1850	±2010	Evaluation corresponding CBS methods
Population		Million inhabitants	3.1	16.6	
Material well-being and well-being					
Consumption, income	Consumer expenditures per capita, constant prices	annual expenses per capita. Index: 1850=100	100	581	↑
	Income inequality, general	gini coefficient: 0–1	0.48	0.32	↑
	Gendered income inequality	% difference in hourly wage M/F	?	19	↑
Subjective well-being	Satisfaction with life	score 0–10	?	8	↑
Personal characteristics					
Health	Life expectancy	years	37	81	↑
Nutrition	Height	cm	165	(183)	↑
Housing	Housing quality	% slums and hovels	30 á 50	<1	↑
	Public water supply	m ³ /capita	0	120	↑
Physical safety	Murder victims	number per 100.000 inhabitants	0.8	(1.1)	↓
Labour	Unemployment	% workforce	6.4	5.0	↑
Education	Level of education	years	3	(11)	↑
Free time	Free time	hours/week	?	44.7	↑
Natural environment					
Biodiversity	MSA	% of original biodiversity	73	(63)	↓
Air quality	SO ₂	kg SO ₂ /capita	1.3	4	↓
	Greenhouse gas emissions	ton CO ₂ /capita	1.2	10.6	↓
Water quality	Public Water supply	m ³ /capita	0	120	↑
Institutional environment					
Trust	Generalised trust	% population with adequate trust	?	66.7	↑
Political institutions	Democracy	democracy-index 0–100	0.31	(39)	↑

Legend

↑	Positive development
↓	Negative development

Note: The numbers in brackets are from J.L. van Zanden et al. (ed.), *How was life? Global well-being since 1820* (OECD Publishing 2014) and relate to the year 2000. Numbers for these indicators – measured according to the same methodology – are not available for 2010

Source: See note 23 of this chapter

biodiversity – was higher than at present (73% compared to 63%).²⁶ However, there was in that time also a major environmental problem, namely the organic pollution of surface water and hence the drinking water. That was the cause of serious public health problems.

These figures are not so much the end, but rather the beginning of stories and analyses about the environment, safety, democracy, health etc. In those stories the historical context has to be prominent. In the tables, we have compared the figures for 1850 with those for today. But how should we judge these figures in the context of the middle of the nineteenth century? What did Dutch people at the time think about the different themes?

Take for example the democracy index, indicating that at that time democratic quality was utterly lacking. This indicator has to be seen in relation to the inception of parliamentary democracy. The 1840s was a turbulent decade in politics. King William I, who for many years had ruled as an autocrat, abdicated his throne. This precipitated a discussion on the organization of the state. This was resolved in 1848, at least for the time being, with Thorbecke's new constitution stipulating direct parliamentary elections and introducing ministerial responsibility. This constitutional revolution did not, however, imply the simultaneous emergence of a corresponding political culture. Political instability persisted in subsequent years and there cannot have been much trust in the new political institutions.²⁷

Political instability must certainly be seen as an issue and as an important well-being problem in terms of the monitor. In relation to quality of life another important theme must also be considered. This has to do with two indicators, namely the level of consumer expenditures (150 guilders/year per capita) in combination with income inequality (Gini coefficient of 0.48, where 1 is maximum and 0 no inequality). These reveal – from today's perspective – a disturbing fact, namely that an estimated 21% of the population must have lived *under* the poverty line, in other words must have been 'extremely' poor (for the calculation and the norms see Chap. 4).

On the basis of a first orientation to the quality of life around 1850 two important well-being themes have cropped up: political instability and poverty. There may be other themes of equivalent importance. We will come to these in the course of our investigation. Of the two themes mentioned, we will devote most attention to poverty. As we noted earlier, we have chosen to focus on physical existence and natural capital in the Netherlands. The political situation will be considered primarily in relation to this material aspect.

Poverty as a grave sustainability problem in terms of minimal quality of life demands closer study. Which categories of the poor can be discerned and what was the nature of their poverty? Was the Netherlands in a position to solve poverty with the resources then available and in particular with the available natural capital?

²⁶For the rest, the emission of CO₂ – one of the greenhouse gasses – was low: 1.2 tons of CO₂ per gdp/capita over against 10.1 nowadays. That of SO₂ – an indicator of air pollution – 0 as compared to 80 kton SO₂ per gdp/capita.

²⁷P. de Rooy, *Ons stijpe op de wereldkaart. De politieke cultuur van Nederland in de negentiende en twintigste eeuw* (Amsterdam 2014), 75–79.

The problem of poverty was not unique for the Netherlands around 1850, but an issue indissolubly connected with the history of humanity. This raises an important question. From today's perspective poverty is a big problem, but did it have the same importance in 1850? Contemporaries may have seen poverty as a destiny about which little could be done or as an issue that was under control thanks to *charitas* and poor relief. But if that was not the case, the question becomes: what initiatives did contemporaries undertake to solve the problem and what consequences did these have for the available resources?

It is also important to appreciate how standards for poverty and quality of life have changed over the course of the last century and a half. People demanded an ever higher quality of life. Many inhabitants of the Netherlands would have perceived a normal worker's home of 1850 as a hovel only 50 years later. This study is alert to how norms change in the course of time and how increases in quality of life and adaptation to new demands for quality took place. At the same time our analysis pays attention to what is called 'contested modernization.' The growth of well-being sometimes assumed unbridled forms, giving rise to entirely new problems of quality of life. Whereas in 1850 the field of food and health was dominated by malnutrition, the last decades have confronted us with obesity as a new social problem.

2.4 Well-being 'Later': 1850 Versus 2010

Capitals or resources for 'later' are the theme of the second dashboard of the CBS monitor. From today's perspective, there was an enormous potential to develop the resources available in 1850. This is a simple conclusion in retrospect, but how was this viewed at the time?

The indicators of natural capital, as is to be expected, show a modest per capita consumption of energy and raw materials in 1850 (Table 2.2). At the time, energy was extracted from domestic turf and to a lesser extent from coal – which was for the most part imported. Raw materials also included mineral sub-soil assets (clay, sand and earth) and agricultural produce. The available natural capital could have been more intensively and extensively exploited – even on the basis of technologies then existing.

The sustainability monitor reveals a dilemma here. Biodiversity and air quality were in good shape, compared to today. From today's perspective, intensive exploitation of natural capital suggests a negative and undesirable development, while the solution for poverty as an important sustainability issue requires precisely that. Natural capital demands a fundamental analysis. To what extent did the exploitation of natural capital result in the depletion of raw materials, the pollution of the environment and the destruction of 'nature?' To what extent were prior generations aware of this and were nature and environment seen as relevant issues?

History shows that the exploitation of natural capital could occur in many different ways and that it did not always imply sustainability problems, for example in the case of a circular economy. History also shows that some problems

Table 2.2 Dashboard well-being ‘later’, 1850 versus 2010

Theme	Indicator	Unit	±1850	±2010	Evaluation corresponding CBS methods
Natural capital					
Energy	Energy consumption	TJ/capita	0.03	0.17	↓
Non-fossil raw materials	Gross domestic consumption	ton/capita	2.1	9.8	↓
Biodiversity	MSA	% original biodiversity	73	(63)	↓
Air quality	SO ₂ emissions	kg SO ₂ /capita	1.3	4	↓
	Greenhouse gas emissions	ton CO ₂ /capita	1.2	10.6	↓
Water quality	Public water supply	m ³ /capita	0	120	↑
Economic capital					
Physical capital	Economic capital stock/capita	index: 1850=100	100	1046	↑
Financial capital	Gross national debt	% gdp	194	59	↑
Knowledge	Stock knowledge capital	index: 2010=100	0	100	↑
Human capital					
Health	Life expectancy	years	37	81	↑
Labor	Unemployment	% workforce.	6.4	5.0	↑
Level of education	Schooling	years	3	(11)	↑
Social capital					
Trust	Generalised trust	% population with adequate trust	?	67	↑
Political Institutions	Democracy	democracy-index: 0–100	0.31	(39)	↑

Legend

Positive development
Negative development

Note: The numbers in brackets are from J.L. van Zanden et al. (ed.). *How was life? Global well-being since 1820* (OECD Publishing 2014) and relate to the year 2000. Numbers for these indicators – measured according to the same methodology – are not available for 2010

Source: See note 23 of this chapter

could be easily eliminated in consequence of the transition from the use of coal to oil to natural gas (like air pollution as a result of SO₂ emissions, while others were more intractable (like the ever-increasing manure surpluses in the dairy industry and the consequent eutrophication of the soil and sub-soil). This study singles out the negative effects that have followed on the exploitation of natural capital in the Netherlands. This makes it possible to acquire more insight into the roots of today’s sustainability problems like climate change and the loss of biodiversity. These problems do not stem from the most recent period, but are the result of long-term manipulation by humans of the natural environment. It is only by adopt-

ing an intergenerational perspective that we can assess the extent to which societal activities have really increased our well-being.

With economic, human and social capital exhaustion can be prevented by reinvesting in the associated resources. The figures show that these forms of capital exhibit definite improvement between 1850 and 2010. It is also important to investigate the quality of the investments. For example, one of the three themes within economic capital in the Monitor is physical capital. This consisted for the most part of ‘classic’ investments in buildings (houses, workplaces, churches, government buildings), in infrastructure (roads, waterways and land reclamation) and in tools, machines and means of transport (sailing ships, windmills, etc.).²⁸ The question is how much was invested in a modern economy, e.g. in railways and steam engines, textile and bread factories.

From today’s perspective human capital in 1850 was of a low quality, among other things because of widespread poverty, low life expectancy and a low level of schooling. Nowadays we see a connection between these factors and low levels of economic growth and well-being. To what extent did contemporaries want to invest in the improvement of public health and schooling in order to improve well-being in the future?

Social capital, a measure of social integration and political culture, is represented in the Monitor by two indicators: the democracy index and generalized trust. These indicators – as far as can be ascertained – paint a negative picture. What influence did the problematic nature of social capital have on the issue of poverty?

2.5 Well-being ‘Elsewhere’: 1850 Versus 2010

Nowadays, largely thanks to the Brundtland Report, much more attention is paid to how countries pursuing their own well-being lay a claim on resources elsewhere in the world. This issue will also occupy us in this volume. That said, the third dashboard of the monitor – ‘elsewhere’ – is based on only a very limited set of indicators. There is still much uncertainty – especially for historical research – about indicators that get to the core of the problematic transboundary dynamics of well-being.

Here we will hew to the international framework and work with two indicators: development aid and import from developing countries (Table 2.3). ‘Development aid’ and ‘developing country’ are anachronisms for the nineteenth century and have no meaning for an analysis of the situation in 1850. The notion of ‘developing country’ refers to the large present-day differences in well-being between, for example, the Netherlands and other countries. Such differences also existed in 1850. As noted above, the Netherlands and Great Britain were then the richest countries in the world. Most of the world was significantly poorer than the Netherlands. In comparison with the Netherlands, global poverty must have been of a different order altogether. The majority of the world population must have lived around or under the poverty line.

²⁸ J.L. van Zanden en A. van Riel, *Nederland 1780–1914. Staat, instituties en economische ontwikkeling* (n.p. 2000), 346–351.

Table 2.3 Dashboard well-being ‘elsewhere,’ 1850 versus 2010

Theme	Indicator	Unit	±1850	±2010	Evaluation corresponding CBS methods
Material Welfare					
Consumption, income	Development aid	% gdp	–	0.8	↑
Natural capital					
Natural capital	Import of raw materials	ton/capita	0.41	12.9	↓

Legend

	Positive development
	Negative development

Source: See note 23 of this chapter

The evaluation of the third dimension will take account of this context. We will take Dutch imports as a point of departure (Table 2.3). In 1850 these amounted to about 1300 kiloton, or 0.4 ton per Dutchman compared to about 214,000 kiloton or 12.9 tons per Dutchman in 2010. Imports have increased dramatically, both absolutely and relatively. The increase is indicative of the globalization of which the Netherlands is a part. Where do the imports come from? How did they influence – insofar as this can be determined – resources elsewhere? In present-day terms: what was the ‘footprint’ of the flow of foreign goods to the Netherlands?

In this connection the Dutch colonies demand special attention. Recent reports reveal that in comparison with other EU countries the Netherlands imposes a heavy burden on the natural resources of the poorest countries.²⁹ It has been suggested that this passing of the buck can be partially explained by the Netherlands’ colonial past.³⁰ In this book we investigate what role foreign regions, and in particular the colonies, played in the growth of Dutch well-being.

2.6 Natural Capital: 1850 Versus 2010

The results of the Monitor for 1850 and 2010 reveal that over the last century and half the Netherlands has depleted some of its available natural capital. Hence this volume will examine the development of natural resources in greater detail by means of an analysis of raw materials and their derivative material flows.

²⁹CBS, *Sustainability monitor of the Netherlands 204. Indicator report* (Den Haag 2015), 34–37.

³⁰H. Langenberg and J.P. Smits, ‘Invoer van grondstoffen uit LDCs: geworteld in koloniale tijden?’, *Internationaliseringsmonitor 2015 (4)*, 43–57. See: <https://www.cbs.nl/nl-nl/publicatie/2015/44/internationaliseringsmonitor-2015-vierde-kwartaal>

Table 2.4 shows how big the increase in raw materials was between 1850 and 2010. For bio-raw materials there was a 13-fold increase and for mineral and fossil sub-soil assets the factor was even higher (respectively 71 and 65). Population growth in this period goes some way toward providing an explanation for this explosive increase. But even the per capita growth of raw materials remains huge. For bio-raw materials this increased by a factor of 2.8 and for mineral and fossil sub-soil assets by, respectively, 13 and 12. These figures also show the extent to which claims on natural capital, measured as volume of raw materials, has become more international. For example imports of fossil raw materials rose between 1850 and 2010 from 18% to an impressive 69%, while exports rose from 1% to 47%. The other raw materials also reveal a growing integration with the global economy.

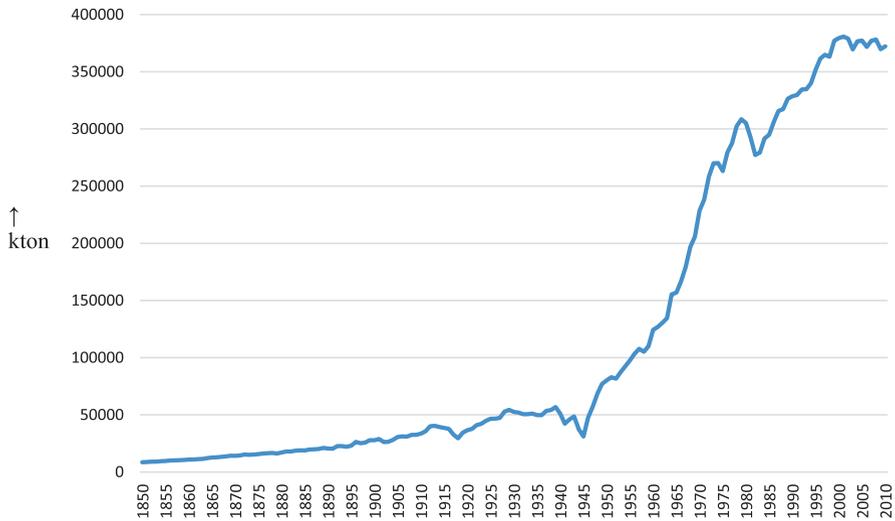
The increase in the total number of raw materials is not evenly distributed over the entire period (Graph 2.1). It fluctuates over time due to the two world wars and the economic depression in the thirties. However, a clear break in the trend can be seen around 1960. Between 1850 and 1960, annual growth averaged about 2.5%. In the period 1960–1975 it increased by 5.1% annually and then weakened to an average of 1.0% between 1975 and 2010 (see also Table 22.1).

Table 2.4 Raw materials in the Netherlands 1850 versus 2010

	1850	2010	Ratio 1850:2010
Bio-raw materials:			
Gross available	5260 kton	67,020 kton	1:13
Bio/capita	1.7 ton/capita	4.0 ton/capita	1:2.4
% import	11%	31%	1:2.8
% export	6%	23%	1:3.8
Mineral sub-soil assets:			
Gross available	1350 kton	95,570 kton	1:71
Mineral/capita	0.45 ton/capita	5.8 ton/capita	1:13
% import	11%	58%	1:5.3
% export	2%	17%	1:8.5
Fossil sub-soil assets:			
Gross available	3060 kton	199,630 kton	1:65
Fossil/capita	1.0 ton/capita	12.0 ton/capita	1:12
% import	18%	69%	1:3.8
% export	1%	47%	1:47
Total raw materials:			
Gross available	9670 kton	372,220 kton	1:37
Raw materials/capita	3.1 ton/capita	21.9 ton/capita	1:7
% import	13%	59%	1:4.5
% export	4%	35%	1:8.8

Remark: Gross available = domestic production + imports

Source: F. Lambert, *Massastromen in Nederland. In de jaren 1850, 1913, 1970, 2010* (researchrapport Technische Universiteit Eindhoven, oktober 2016)



Graph 2.1 Total use of raw materials in the Netherlands, 1850–2010 (kton)

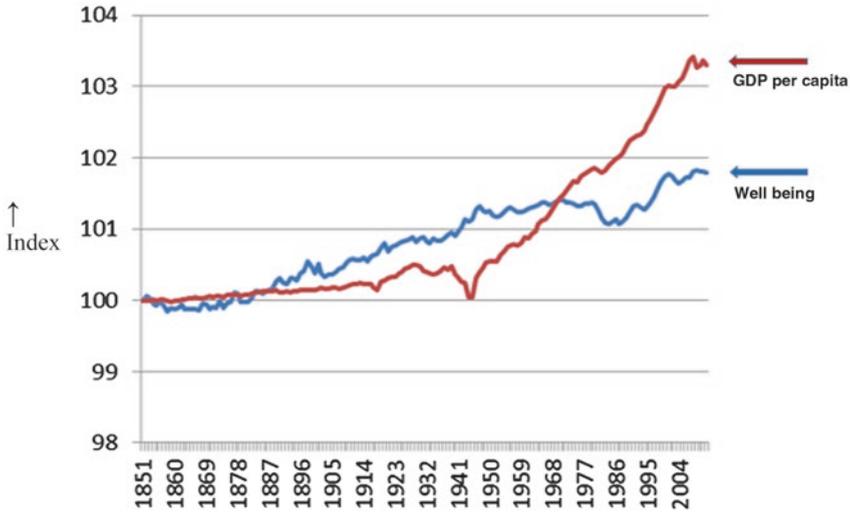
Note: Use = domestic production + import

Source: See note 10 of Chap. 24

2.7 The Great Transformation, the Tradeoff and the Fundamental Questions

The fifties and sixties of the twentieth century are also a special period for the development of economics, well-being and sustainability. Graph 2.2 shows the relationship between the growth of GDP per capita and the quality of life after 1850.³¹ These figures show that economic growth and the development of well-being do not always go hand in hand. In the period from 1850 up to 1880 we see that well-being lags a little behind economic growth. After that time until the sixties of the twentieth century, however, the expansion of the quality of life is stronger than one might expect on the basis of economic growth. After that we see that economic growth has been accompanied by ever smaller increases in welfare. How can we explain these differences? Which factors determine the extent to which growth in GDP translates into increases in welfare or not? The relationship between growth in

³¹ Technical explanation: Figure 2.1 compares the growth of GDP with an unweighted average of indicators for the quality of life ‘here and now.’ All the time series data are standardized, so that they all have the same bandwidth, preventing series that can increase without limit (like consumptive expenditure) from exerting more influence than series that by their nature move within a more limited bandwidth (as for example average life-expectancy, being constrained by demographic limits). Due to this standardization technique, the graph exhibits deviations within a limited bandwidth.



Graph 2.2 Well-being effects of economic growth in the Netherlands, 1850–2010 (compressed and composite index 1850 = 100)
 Technical explanation: See note 5 of Chap. 22

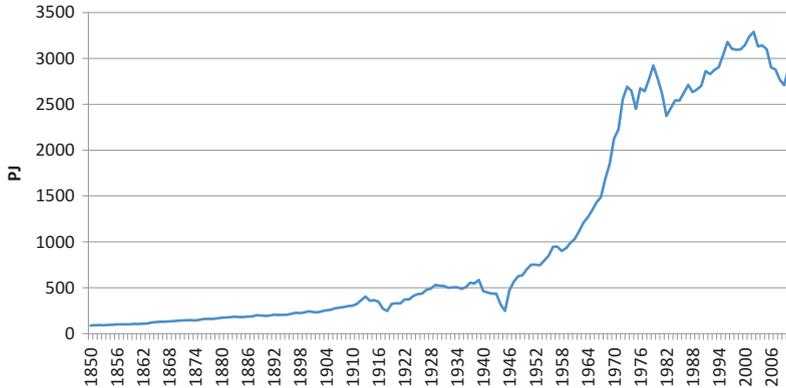
GDP and increases in well-being appears to be very complex. In the rest of this volume the nature of this relationship will be investigated from period to period.

In addition to an examination of the development of well-being we are also interested in this study whether the increase in quality of life has been accompanied by overexploitation or even depletion of Dutch or foreign resources. From a present-day perspective the greenhouse gas problem is one of the greatest sustainability challenges.

In an economic system largely based on the exploitation of fossil fuels, every form of economic development is accompanied by CO₂ emissions. Still, important differences among the various periods can be ascertained. For example after 1850 economic growth is clearly associated with an increase in energy consumption (Graph 2.3). After the Second World War, however, energy consumption increases more than ever before. The same applies to greenhouse gas emissions, which means that the sustainability norm for CO₂ emissions around 1970 is exceeded (see also Graph 22.3).³² How can this sudden turnabout be explained? Which economic activities were responsible?

Next to these general tradeoffs we also focus on more specific tradeoffs, for example that between biodiversity and efforts to achieve nutritional security or that between the quality of water, soil and air and the processes of upscaling and increas-

³²J.P. Smits, 'De omvang en oorsprong van de milieuschade 1910–1995', in: R. van der Bie en P. Dehing, red., *Nationaal goed. Feiten en cijfers over onze samenleving (ca) 1800–1999* (Den Haag-Heerlen 1999), 235–254. Zie: <https://www.cbs.nl/NR/rdonlyres/8EC09284-EF4A-4C0A-8FA3-CA95AB7ED4B1/0/nationaalgoed.pdf>



Graph 2.3 Total energy consumption in the Netherlands, 1850–2010 (PJ)

Source: H. Hölsgens, *Energy transitions in the Netherlands: Sustainability challenges in a historical and comparative perspective* (Groningen 2016), 11–12 and B. Gales and H. Hölsgens, ‘Energy consumption in the Netherlands (1800–2012)’, in: H. Hölsgens, *Energy transitions in the Netherlands: Sustainability challenges in a historical and comparative perspective* (Groningen 2016), appendix I

ing consumption of energy. Issues like these are central to the upcoming chapters of this volume. We continue to focus on the choices historical actors made in solving their sustainability problems, on the technologies that they employed and above all on the institutional context that helped or perhaps hindered them in finding solutions.

2.8 The Structure of This Book

In this volume we distinguish three periods: 1850–1910, 1910–1970, and 1970–2010. Periodisation is of great importance because the relationship between economic growth and the development of well-being and sustainability is not linear. It always involves complex relationships that have to be studied in their specific institutional context.

This choice of periods has to do with the availability of data for the years 1850, 1910, 1970 and 2010. In addition, these years are seen as important watersheds in the social-economic literature.³³ An economic and technological perspective also justifies the choice for these periods.³⁴

³³ See for example: A. Maddison, *Dynamic forces in capitalist development. A long-run comparative view* (Oxford 1991). Maddison uses 1850, 1913 en 1973 as turning points.

³⁴ J.P. Smits, H. de Jong en B. van ark, ‘Three phases of Dutch economic growth and technological change, 1815–1997’, *Groningen Growth and development Centre Research Memorandum GD 42* (Groningen 1999). See: <http://www.ggdc.net/publications/memorandum/gd42.pdf>

The period 1850–1910, certainly for the Netherlands, counts as that of the classical first industrial revolution with steam, textiles and the factory system as important features. The period 1910–1970 may at first sight appear to be anything but homogeneous. From a political perspective this is certainly the case; the period was characterized by a major economic depression in the interwar period and by two world wars. From a technological and economic perspective, however, it can be seen as a single period, shaped, among others, by a second industrial revolution rooted in electricity, chemistry and large-scale industrial enterprises.³⁵

The first years of the 1970s can be seen as a turning point in many respects. Technologically speaking, the system of the second industrial revolution had by then all but exhausted its potential.³⁶ By the 1980s the contours of a new techno-economic regime could be discerned, a regime that emphasized information and communication technology, services and small and medium sized businesses.³⁷ Finally, at the outset of the 1970s it was becoming apparent that in an ecological sense we were reaching the ‘limits to growth.’ More and more attention was paid to the problem of the inordinate claims of economic growth on natural resources.³⁸

For each period we review the results of the well-being monitor and present detailed data about natural capital. We consistently analyze developments in terms of the analytical quadrants of political and economic institutions, the societal ‘mid-field,’ and the knowledge infrastructure.

To start off with, however, we shall examine in greater detail the situation around the middle of the nineteenth century, aiming to sketch an adequate frame of reference for subsequent periods. How did the Netherlands exploit its natural capital? How should we understand the quality of life around 1850? What were the most important issues in regard to well-being and sustainability from a present-day *and* a contemporary perspective?

We conclude the book with a summary of the historical development and a preview of 2050. Can we learn from history with a view to a sustainable future?

³⁵R.J. Gordon, ‘US economic growth since 1870: one big wave?’, *American Economic Review* 89 (2) 1999, 123–128. Gordon argues that this ‘one big wave’ was impelled forward by, among other things, a second industrial revolution.

³⁶J.P. Smits, ‘Technology, productivity, and welfare’, in: J. Schot, A. Rip and H. Lintsen, eds., *Technology and the making of the Netherlands. The age of contested modernization, 1890–1970* (Zutphen 2010), 454–455.

³⁷Smits, Technology, productivity, and welfare, 455–456.

³⁸The birth of this modern environmental consciousness is marked by among other things Rachel Carson’s study of the DDT crisis and the way in which poisonous substances can penetrate deeply into ecosystems in a short span of time: Rachel Carson, *Silent Spring* (Harmondsworth 1962). Extremely influential in the early 1970s was the Report of the Club of Rome, ‘limits to growth’: Meadows et al., *The limits to growth: a global challenge* (n.p. 1972).

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