(A preliminary translation of the original Finnish text)

Olli Tammilehto:

The Tragedy of Transport

The Earth under Pressure from the Global Transport Net

Contents

Introduction

Current globalisation discussion does not focus on the actual transport of goods. In everyday conversation and in scientific discourse it often comes up that the production is moved to Far East; the consumption of the goods and foods takes place in the opposite side of the globe than the production, holidays are spent in distant lands; contacts are kept in real-time with people living in different continents; the natural resources of poor countries are being developed, refined, processed, destroyed, appropriated, etc. And even when the transport of the goods is emphasized, the passive expressions – such as “flow of goods” and “transfer of resources” – are used. It is a not very often noticed fact that ships, aeroplanes, cars, trains, pipelines and high voltage lines, including all the people working with them, are constantly transporting goods and products from one country to another.[1]

Nevertheless, the global economy is literally based on international transport, and its present extent leans on the exceptionally inexpensive and expeditious transport. Besides, there is nothing new as far as the significance of transport is concerned. The ability to cross many kinds of barriers has always been a gateway for our economic system[2] to take the dominant position in different regions and in different fields. By the means of long-distance trade the early capitalism tried to get rid of the control of local, regional and national markets.[3] Since the 18th century the possibilities of local and working class communities to have an influence on economic processes have been reduced by manipulative siting of production plants and working class neighbourhoods.[4] Even the time-related limits set by biology have been challenged by our economic system: it takes time to recover after fatiguing working hours, to give birth to the next generation and to support its growth, and regenerate areas of nature under economic utilization. And extra time is something that capitalism seems never to afford. In consequence, both people and natural resources have been used up and decent growth milieus for children have been ruined. Instead of actual regeneration the demanded resources have been acquired from other regions and other countries.[5]

New transport systems have strongly contributed to this development. Characteristic of merchant capitalism were ocean-going ships,[6] whereas of the early industrial capitalism at first were the canals and later the railway.[7] The system based on mass consumption has depended in many ways on wheels and road traffic: a motorized vehicle has not only served as a means of transport for the goods and the consumers, but it has also been one

1 On ignoring transports in scientific globalisation discussion, see Steinberg (1998).

2 Transports have had great importance in some other economic systems, too. This was the case in real socialism that resembled capitalism in many ways. Also in the Roman Empire based on agriculture and handwork done by slaves the transports had an essential role.

3 On the antagonism between capitalism, on the one hand, and historical market economy and the ideal market that occurs in text books and economic rhetoric, on the other, see, e.g. Braudel (1988), Wallerstein (1983).

4 See, e.g. Dickson (1974), Holloway (2002) and Tammilehto (1998).

5 Brennan (2003).

6 See, e.g. Linebaugh & Rediger (2000).

7 See, e.g. Wolf (1996), Sachs (1989).

of the main commodities. Car has also been a key instrument in producing the consumerist lifestyle that decreases communal human relations and makes it easier to control people.[8] In its turn, the global capitalism of the last decades has leaned strongly on flight traffic in transporting people and goods that are considered important, in creating of the intermetropolitan network, and in executing a worldwide civil and military governance.[9]

Building and maintaining the transport systems have demanded enormous efforts from millions of people and have often taken their health or life as a sacrifice.[10] The fact that the construction of the northern railway lines in Soviet Union took lives of innumerable forced labour convicts is not surprising.[11] Less known fact is that the first transcontinental railway in the United States claimed thousands of human lives – the victims being mainly Chinese workmen. 20 000 lives were sacrificed for the Suez Canal. The Panama Canal took 27 500 human lives.[12] On top of those who work on these back-breaking construction projects are those who are compelled to give their contribution in the form of tax payments, loss of access to natural resources, deterioration of the environment or military service.

To justify the great losses incurred by transport systems, many ideologies idealizing the passage have been developed.[13] For example, the sailor stories depict seafaring as an emblem of individual freedom, albeit the seamen have often done their life-threatening work in conditions that resemble slavery. Strong allusions of power and conquest of nature – that were considered clearly positive by most of the people in the past – have been associated with railways.[14]

Together with power, social status and many other things to strive for, freedom has been strongly linked to cars. In fact the motorist easily stucks in traffic jams, is being controlled by the traffic planners and police, and is highly depended on imperialistic armies, oil companies, car industry, etc.. Enchained by all this and the monetary demands of his expensive lifestyle he is everything but free.[15]

Aviation has signified enchanting power and dominion, bringing dawn of the New Era in which the forces of nature have finally been subdued to serve mankind, and in which human kind cuts free from the chains of time and place.[16] On the other hand, as aviation has become more general and the standard of service of the aviation industry freed from national regulations has reduced, the fascination of flying itself has dimmed in the eyes of most people in Global North.[17] This has been replaced by the cosmopolitan glamour made

---

8 See, e.g. Krüger-Charlé (1989), Roth (1987), Sachs (1984), Böhm *et al.* (2006b), “The importance of the car to the modern economy” (1994), Illich (1985) and Wolf (1996).

9 See, e.g. Bel & Fageda (2005), Smith & Tiberlake (1998).

10 For a discussion of cruel exploitation of labour related to navigation in the 17th and 18th century, see Linebaugh & Rediger (2000); on building the British canal system by exploitation of Irish labour, see Wolf (1996), p.7; on strict discipline and lethality in railway construction sites in the 19th century, see Wolf (1996), p.28.

11 See, e.g. Michaels (2002).

12 ACP (2001), see e.g. Wolf (2007), pp.58, 109–10.

13 For discussions of ideologies as manners of thought and speech justifying the exercise of subjugation and other negative societal practices; see, e.g. Eagleton (1991), Tammilehto (1998).

14 See, e.g. Sachs (1989).

15 See, e.g. Böhm *et al.* (2006a), Rajan (2006), Martin-Jones (2006), Salmi (1991) and Hill (1988), p.103.

16 See, e.g. Verhagen (2003), Conversino (2007).

17 See, e.g. Gottdiener (2001), Verhagen (2003).

possible via air. While these ideologies have made it easier to accept different forms of personal traffic, simultaneously they have facilitated succumbing to the disadvantages of the transport of goods.

Thus one of the keystones of the present global economic and social system is the worldwide transport system. Thousands of kilometres long, ongoing day and night transports of food, oil, steel, aluminium, paper, cars, machines, electronic devices etc. are its fluid for life. But even when the production and consumption are relatively local, inexpensive international transportation gives a reason to a global comparison of prices, salaries and production costs. This can bee a crucial factor in production decisions. Yet transports are not only facilities of production and consumption. They are also goals of production and targets of consumption. A significant chunk of the production of goods and services take aim to constructing and maintaining the transport system.

The enormously swollen global militarism seeks part of its legitimacy in safeguarding the transports.[18] In the report "National Security Consequences of U.S. Oil Dependency", written by the elite of the both main political parties of the United States, the importance of the forceful military presence in the strategic oil transportation routes is emphasized.[19] The fact that the US maintains over 700 military bases in 100 countries[20] seems to have something to do with this. For instance, a justification of the biggest military base since the Vietnam War, the Camp Bondsteel, which was constructed in Kosovo after the bombing of Yugoslavia, has been safeguarding the oil transportation.[21]

There is a historical background for the contradiction between the high importance of international transport and the small attention it has gained. From the very beginning of the industrial capitalism, the oceans – where most of the global traffic has taken place – have been constructed discursively to serve as an empty and wild space outside the society. For example, in the end of the 19th century when International Maritime Law was drafted, it was wittingly taken out from the hands of governmental authorities and left to the self-regulation of the shipping companies. Ships that did not carry any nation's flag were considered as hostile towards the civilized world and were declared enemies of mankind, *hostis humanis generis.*[22]

18 For discussions of the dependence economic globalisation on militarism, see e.g. Sharma & Kumar (2003), Friedman (1999), Fotopoulos (2002) and Chomsky (2001).

19 "U.S. Naval protection of the sea-lanes that transport oil is of paramount importance." Independent Task Force (2006), p.45.

20 Johnson (2004), Johnson (2007).

21 See, e.g. Stuart (2002).

22 Steinberg (1998).

Growth and Volume in the International Transport of Goods

There are many difficulties in piecing together the quantity of the international transport of goods[23]. One of them relates to the true scope of the term: which transportations are included in the definition *international*. As it turns out, it is natural to define as international all the transportations that cross a boarder[24], but the trouble starts when there is a decision to be made about where to start and where to end an individual transport. The marine transports, for example, are always in both ends connected to land transports: to lorries , trains or pipelines. An electronic appliance that reaches the harbour will at first be transported into the importer's warehouse, then to the retail shop, and finally someone buys it and carries it home. In most presentations the chain is cut off in some point and, for example, only the transportations up to the importer's warehouse are considered. However, the aim of this study is to discern the whole chain from the producer to the consumer. To some extent, it will touch the transports of raw materials which end up to the producer, and the transports of waste which originate from production and consumption.

The second problem is caused by the fact that the same vehicles transport both the passengers and the goods. Within the intercontinental air traffic this is a common practice.[25]

The third matter relates to the basic information available. Extensive statistics of the international transports do not exist. Yet the scale can be estimated on the basis of the statistics on foreign trade, economy and traffic as well as from the existing information concerning individual transport sectors.

International transports were for the long period of time insignificant in economic sense excluding the border districts. People managed on products that were locally produced or exchanged in regional markets. Certainly, these transports had their own political significance, as the elite sought to distinguish from common people by using products that were brought over long distances.[26]

The conquest of America in the early modern era made international transports more important, as large amounts of silver – stolen or gained by force or slave labour – were loaded to European ships. A substantial part of this metal was taken straight to China, which supplied textiles and other desired handicraft products.[27] Yet it was not until the 18th century when the foreign trade began to affect the lives of the common people. Within the Triangular trade, the products of British manufactories and mills like alcohol, metalware and clothes were freighted to Africa, where they were traded to slaves that were taken to the new continent. America supplied Europe with sugar, rum, cotton and tobacco.[28] From the year 1700 to the year 1800 the tonnage of the ships sailing from the harbours of

23 Similarly to this study these difficulties come up for example in Brennan (2003), eg. p.43.
24 See, e.g. Karhunen & Ernvall (2007), p.27.
25 See, e.g. Karhunen & Ernvall (2007).
26 See, e.g. Braudel (1988).
27 See, e.g. Weatherford (1988), Simms (2005) and Pomeranz (2000).
28 See, e.g. Pomeranz (2000), Linebaugh & Rediker (2000).

England increased sixfold from 317 000 tons to 1 924 000 tons. But for international transports the ships and harbours were not enough. The goods had to be delivered from inland to coast. Mainly for this purpose the navigable inland waterways in Britain were lengthened with 5500 kilometres in the late 18th and the early 19th century.[29]

The growth of foreign trade was even more rapid in the19th century. The value of the foreign trade of the countries dominating the world trade was increased eighteenfold between the years 1830 and 1910.[30] The new inland transport routes alongside with ships were needed to achieve such a growth. Instead of canals the transport to harbours was facilitated in the latter part of 19th century by building railways. As in 1845 the total length of the British, French and German railways was 6000 km, 50 year later it was 117 000 km[31]. These railways were utilized also by the home markets of the countries. Yet the only purpose of the railways constructed by forced labour for the colonial masters in Africa, Asia and Latin America was to serve the foreign trade of the master race[32.]

The World Wars and the Great Depression had devastating effects on the international economy. Despite the post-war upswing the volume of global trade was in 1950 at the same level as it had been in 1913[33]. In the same year as the Korean War broke out, goods were transported in the world for the amount of 517 billions $ (in dollars of 2006[34]), and the share of export in world gross domestic product was 7%. By the year 1988 the export had increased thirteenfold being 6 800 billions of dollars. In eight years the export nearly doubled, and was already 12 000 billions of dollars in 2006.[35] In 1990 export's share of GDP was 19% and, according to the World Bank, it had climbed to 24% in 2004[36].

The bulk of export has been done at least partly by ships. In consequence, the quantity of goods transport by sea increased over sixfold from 1955 to 1998, when it was over 5000 million tons[37]. In 2004, it had risen to more than 6500 millions of tons. On the other hand, additionally to the increased volume of transports also the distances have grown longer. The performance of a transport system is often measured in tonne-kilometres, in which case the volume of transports is multiplied by the number of kilometres travelled. In between the years 1970–2005 the performance of shipping industry trebled from 18 000 to 54 000 billions of tonne-kilometres.[38]

The growth in air cargo has been even more rapid: during the years 1950–1998 it expanded hundredfold from 730 million to 99 billion tonne-kilometres[39]. It has continued to

29 Wolf (1996), p.5.

30 Wolf (2007), pp.103–04.

31 Wolf (1996), p.23.

32 See, e.g. Wolf (2007), pp.95–96, Foster (1994), p.89 and WBCSD (2002), pp.6–22.

33 Wolf (2007), p.12.

34 The dollar value of 2006 has been calculated with the Consumer Price Index Inflation Calculator of the U.S. Department of Labor [http://data.bls.gov/cgi-bin/cpicalc.pl].

35 French (2000), p.6, Veen-Groot & Nijkamp (1999) and UNCTAD (2007).

36 The World Bank Group (2006).

37 French (2000), p.35.

38 Karhunen & Ernvall (2007), pp. 60–61, Zachcial & Heideloff (2005), p.105.

39 French (2000), p.6.

increase and in 2005 it was 140 billion tonne-kilometres[40].

In fact, transport from one country to another is nowadays one of the key branches of the economy. The European Commission has estimated that the global transport system and the forwarding, terminal and storage services related to it take 14% of the world production[41].

In 2004, the proportion of traffic in the commercial use of energy[42] worldwide was approximately 26%[43]. Traffic consumes half of the oil[44]. Transports of goods took approximately 40% of the energy used in traffic[45]. Thus the share of transport of the total energy consumption was approximately 10% in the above-mentioned year. It is hard to calculate the exact portion that the international transports demand directly. However, it can be deduced from the distribution of the traffic energy consumption between different forms of transport[46], that the transport energy is consumed as follows: road transport approximately 65%, sea transport over 20%, air cargo approximately 10% and railway transport only a few percent. Greater part of the sea transport is international as well as 80% of the air cargo[47]. The trickiest part is to estimate the level of internationalization of the road transport. In the United States, over 13% of the national road transport of the goods has been estimated to have connection to international trade[48]. In the USA the food is not transported by road in substantial amounts from across the border in contrast to Western European and other such countries where road transport is used widely[49]. Thereby, at the worldwide level the share of international road transports is apparently distinctly higher than in USA. On these grounds, it can be estimated that international transport takes 40% of the total transport energy. Accordingly this would be approximately 4% of the total commercial use of energy.

40 Airbus (2006), p.74.

41 European Comission (2006).

42 International energy statistics do not count passive solar energy utilization nor other non-commercial energy sources.

43 Kahn *et al.* (2007), p.328.

44 Plouchart (2005).

45 WBCSD (2002), p.62.

46 See, e.g. Kahn *et al.* (2007), p.328.

47 International Civil Aviation Organization (2001), p.18; figure is from the year 1999.

48 Measured in tonne kilometres, see Horowitz & Plewes (2005).

49 See, e.g. Böge 1996.

Means of Transport and Environmental Destruction

The global transport system worsens directly several environmental problems. Land, ship and air traffic, as well as the pipelines and high voltage power lines, have an immediate effect on most of the environmental problems.

Climate Change

When it comes to boosting the disastrous climate change, international transports have played a significant role. In 2004, traffic produced 23% of the energy-related carbon dioxide emissions (CO_2).[50] Diverse means of transport release into the air also other compounds that cause warming of the atmosphere. These so called greenhouse gases include methane, nitrous oxide and fluorinated hydrocarbons. According to a rough estimate, the whole amount these other gases is approximately 7% of CO_2 emissions calculated as CO_2-equivalent[51] emissions.[52] Naturally, traffic is not the only source of these greenhouse gases. In consequence, the Intergovernmental Panel of Climate Change (IPCC) estimated that in 2004 traffic's share of all the energy-related greenhouse gas emissions was the same 23%. Taking into account that also agriculture and forestry, other land use, industrial processes and waste disposal release plenty of greenhouse gases into the air, traffic formed a smaller percentage of the human-created emissions of greenhouse gases in total, being 13.1%.[53]

However, new studies suggest that the portion of traffic is even larger. Apparently, the ships engaged in international transport use 2.5 times more fuel than is presented in the energy statistics, on which the emission accounts are based.[54]

The volume of traffic has increased rapidly worldwide. Thus, the greenhouse gas emissions of vehicles have risen 27% since 1990 and 120% since 1970, and at the same time their share of emissions from all sectors has grown.[55] Unless any remarkable changes occur, the traffic emissions continue to increase. It has been estimated, that in 2050 traffic accounts for 30–50% from all the CO_2 emissions.[56]

---

50 Kahn *et al.* (2007), p.325.

51 Carbon Dioxide Equivalent is used to compare the emissions of the different greenhouse gases based upon their global warming potential by converting the amount or concentration of a greenhouse gas to an amount corresponding to the impact of carbon dioxide.

52 Kahn *et al.* (2007), p.331.

53 Intergovernmental Panel for Climate Change (2007b), p.4. These percentages are only suggestive because the uncertainty margin of the estimates of total greenhouse gas emissions is plus or minus 10–30%, see Lohmann (2005). Especially in emission estimates related to land use the error margin is remarkably large; see, e.g., S. Solomon *et al.* , 'Technical Summary' in S. Solomon *et al.* (eds.) *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge University Press, Cambridge, 2007).

54 Eyring *et al.* (2005), Corbett & Koehler (2003) and Vidal (2008).

55 Kahn *et al.* (2007), p.330, Intergovernmental Panel for Climate Change (2007a), p.2.

56 Fuglestvedt *et al.* (2008).

Assuming that transport emissions are proportional to energy consumption, in the beginning of the 21st century transport of goods formed approximately 9% of energy-related greenhouse gas emissions as a whole. However, this share is currently larger: within all the sectors of economy the traffic emissions grow fastest, and within traffic the transport of goods increases the most.[57] Assuming that international transport accounts for 40% of this percentage, as estimated in the previous chapter, it makes the emission share of international transport approximately 4%. Yet taking into consideration the above-mentioned new studies, the share may raise up to 5–7%.[58]

The impact of transport on climate change can also be measured in other ways than in amounts of greenhouse gas emissions. *Radiative forcing* is a common measurable quantity, which describes how much thermal energy a certain event withholds in a time unit, i.e. how much solar radiant power per square metre it captures. Negative radiative forcing means that an event increases the reflection of solar radiation back to space. When measuring the radiative forcing, one must pay attention not only to the volume of greenhouse gases but into which layer of air, and where – e.g. whether on land or at sea – they are released. Additionally, the possible negative forcing, or climate cooling effect, has to be investigated. The net radiative forcing of the traffic in year 2000 has been calculated for the next one hundred years by a Norwegian research team in its report from year 2008. According to the report, traffic causes approximately 16% of the human-created RF in total,[59] from which a large but apparently smaller than above-mentioned portion falls on international transport.[60]

Other Destruction

Besides the climate change, the increase of greenhouse gases affects negatively in other ways. Fluorinated hydrocarbons deplete the ozone layer and increase the harmful ultraviolet radiation.[61] According to some researchers, the increased concentration of carbon dioxide in the air predisposes people and animals to inflammatory diseases.[62]

In addition to climate changing gases, the means of transport release hundreds of other damaging substances into soil, water and air.[63] Solely petrol consists of 225 noxious or carcinogenic chemicals.[64] Foetuses, infants and the aged are definitely more susceptible

57 Kahn *et al.* (2007), p.325.

58 Eyring *et al.* (2005) bring out that in 2001 freighters used most of the ship fuel (74%) and accounted for 73% of CO_2 emissions. Ocean-going ships accounted for 2.7% of the total CO_2 emissions, so the corresponding share of freighters were 2%; see, e.g. Institut für Physik der Atmosphäre (2007). According to a UN-commissioned study, unpublished at the moment, the CO_2 emissions of merchant shipping account for 4.5% of the total CO_2 emissions; see, Vidal (2008).

59 Fuglestvedt *et al.* (2008).

60 The reason for the decreased share in this measuring technique is presented later in the chapter Dirty Ships.

61 See, e.g. Berninger *et al.* (1996), p.117, Gribbin (1988).

62 Thomas (2007).

63 See, e.g. Tamminen (2006), p.20, World Carfree Network, and Degobert (1995); the latter is an extensive review of a myriad of harmful substances that vehicles release into the air.

64 Tamminen (2006), p.40.

to these substances than the young and middle-aged adults, but standards are usually based on the tolerance of men of working age.[65] It remains unclear, in which way many of these chemicals affect. Especially synergistic effects – i.e. outcomes of several chemicals acting together – are unknown.

Among the significant pollutants are nitric oxides escaping into the air. They lead, for example, to soil and aquatic acidification, forest damages and serious respiratory diseases.[66] The main source of these pollutants is traffic[67]. The trucks and ships emit clearly over a half of the traffic related NO_x[68]. Thus, international transport is one of the main sources of nitric oxide pollution.

Another important pollutant is soot as well as other microscopic particles that are driven far away. They measure less than 10 thousandth part of a millimetre in diameter, hence the name PM_{10} particulates. These particulates are often saturated with hazardous polycyclic aromatic hydrocarbon aka PAH compounds. PM_{10} pollution has various negative impacts: it reduces visibility, affect the climate and damage the buildings. Fine particles can be carried deep into the lungs and take with them PAHs causing asthma, lung cancer and other serious diseases as well as genetic mutations to people and animals.[69] In many countries, traffic is to blame for over 20 percent of human-created particulate emissions.[70] Again in this case clearly over half of the traffic pollutants comes from trucks and ships[71]. Thus international transport is also an important source of particulate emission.

Traffic is also the largest source of harmful noise in modern society.[72] For example, 20–30% of European Union citizens are exposed to excessive traffic noise.[73] Being exposed to noise leads to learning disabilities, hearing losses, high blood pressure, and predisposition to diseases of the circulatory system. It has been noticed that people use more pharmaceuticals and psychiatric services in noisy areas than in quiet areas.[74] It is hard to estimate how much of the traffic noise comes from the freight transport. Yet, heavy-vehicle traffic noise is often experienced as the most disturbing. According to a study done in the UK, 39% considered worst noise of the trucks, 19% of the motorcycles, and 4% of the cars.[75]

In the following I am going to discuss the patterns of destruction related especially to certain forms of transport.

---

65 See, e.g. Steingraber (2001), p.111.

66 See, e.g. Teufel *et al.* (1999), p.8, Degobert (1995).

67 WBCSD (2002), pp.6–19, Degobert (1995), p.25, OECD (1988), p.48, Schau (2003), p.22.

68 WBCSD (2004), pp.38–40, WBCSD (2002), pp.6–20, Eyring *et al.* (2005), p.8.

69 Degobert (1995), pp.43, 71–73, 75, Tamminen (2006), p.14.

70 OECD (1988), p.48, Degobert (1995), p.43, WBCSD (2002), pp.6–19.

71 WBCSD (2004), pp.39–41, WBCSD (2002), pp.6–20, Eyring *et al.* (2005), p.8.

72 OECD (1988), p.43.

73 Schau (2003), p.24, THE PEP (2004).

74 OECD (1988), p.42, THE PEP (2004).

75 Mitchell (1991), p.19.

Deadly Roads

Traffic also kills. In today's world traffic accidents are amongst the most common cause of death.[76] Most of the accidents occur on the highways and streets. In the beginning of the 21st century road traffic accidents caused death to 1.2 million and injury to 50 million of which 8 million were serious injuries. This scourge, too, hits hardest the poorer people in the global South.[77]

Animals are killed even more numerously. On daily basis, solely on the roads in the US approximately one million animals are killed. In a small country like Finland cars kill millions of birds every year. Killing rate is so high that several species are threatened with extinction. Highways are the major threat confronting the near extinct Florida panther, for instance.[78]

Once again, it is hard to estimate the share of freight transport from this figure. According to a British study, with respect to their number, trucks are exceptionally often involved in serious traffic accidents. In the UK, truck accidents caused death only to 75 truck drivers or passengers, whereas they took the lives of 135 pedestrians and 700 other users of the road in 1987.[79] Adapting this to the road traffic accident statistics classifying the types of road users involved in accidents in Western European countries,[80] it can be inferred that transport of goods was, in one way or another, involved with many tens of percent of the lethal accidents in 2003. On the other hand, if these same ratios are valid worldwide, the number of deaths in accidents related to transport of goods is many hundreds of thousands annually. A significant part of this figure is attributable to international transport.

Deaths caused by accidents are not all there is; traffic pollutants kill, too. In various countries they massacre even more people than accidents. According to the World Health Organization (WHO), in Austria, France and Switzerland traffic particulate emissions killed twice as much people as traffic accidents in 1996.[81] Evidently also in the other countries the fine particles which disperse from the highways and water routes kill people in great numbers. As mentioned before, freight transport takes over a half of these emissions.[82] Accordingly also in this context, the list of sins of international transport grows longer.

Road transport contaminates soil and pollutes water systems. Annually, solely in the US cars are leaking and dripping 76 million litres of petrol to environment, which is twice as much as was spilled in Exxon Valdez accident in Alaska in 1989. Even bigger amount of used lubricating oil leaks into soil and water from the cars. In the US over 40% of the lubricating oil, which is over 20 billion litres, is neither recycled nor reused in other ways.[83]

76 Wolf (2007), p.324, WBCSD (2004), p.42.

77 WBCSD (2004), p.42, Fulton & Eads (2004), Peden *et al.* (2004).

78 Surface Transportation Policy Project (2007), Kivivuori (1991).

79 Mitchell (1991), p.23.

80 Schreyer *et al.* (2004), p.136.

81 O'Meara Sheehan (2001), p.110.

82 This does not mean that more than a half of the death toll of traffic pollution derives from goods traffic. Private petrol cars release benzene that causes leukaemia and other cancers, anaemia, immunodeficiency and other sicknesses, as well as many other harmful substances; see, e.g. Tamminen (2006) and World Carfree Network (2007).

83 Tamminen (2006), p.42.

Dirty Ships

In most cases ships engaged in the international transport are fuelled with so called bunker oil; the heavy residue left over from the crude oil when all the lighter and more valuable fractions have been taken off to make petroleum, paraffins, aviation fuel, and chemicals. Used lubricating oil is often added to the fuel. It is the cheapest and dirtiest oil that can run diesel engines. Bunker oil contains high concentrations of toxic compounds banned from use in most other industrial and consumer applications.

Sulphur

Bunker oil contains 5% of sulphur, which is 5 000 times more than in regular diesel.[84] In consequence, ships produced 8% of sulphur dioxide emissions worldwide and over 70% of SO_2 related to traffic in 2001. Cargo ships account for 78% of ship emissions.[85] Sulphur dioxide has similar effects as aforementioned nitric oxides: forest deaths, soil and aquatic acidification, damaging of buildings and monuments, and serious respiratory and other diseases, etc.[86] For example in Europe the busy sea lanes follow the shore, and therefore sulphur emission spreads to large parts of the continent.[87]

Regarding the climate change, sulphur dioxide has a surprising impact: in the air it is converted into sulphate particles, which have a climate cooling effect. Sulphate particles reflect solar radiation back to space and increase the forming of low laying clouds which also have a cooling effect. Organic carbon compounds discharged from ships have a similar but smaller impact. According to some studies, altogether cooling effects are so significant that, all told, ships have had a delaying effect on the global warming until now. With time, the negative net effect changes into positive because the sulphate and other particles cannot stay long time in atmosphere, unlike carbon dioxide. If the behaviour of present emissions is studied from a perspective of 500 years, even the radiative forcing caused by ships is positive.[88] Apparently, in any case the global warming effect of ships would be significantly larger, if there were not those numerous people who consent to sacrifice their health and property on the altar of the economy, and accidentally at the same time on the altar of mitigating climate change.[89]

On the other hand, studies that conclude negative net effect have not paid attention to the impact of the discharged soot from ships on decreasing reflection of snow and ice.[90] According to James Hansen, one of the leading climate researchers, soot discharges from the ships sailing in arctic regions may have a significant impact on melting of ice and in

---

84 WBCSD (2002), pp.6–20, Tamminen (2006), p.43.

85 Eyring *et al.* (2005), pp.3, 8, Institut für Physik der Atmosphäre (2007).

86 Degobert (1995), pp.85 et seq., Sea and Water (2007); sulphur dioxide promotes cancer and other diseases by oxidizing to sulphate, which contributes to forming of hazardous fine praticles, see Canada, Ministry of the Environment of the Province of Ontario (2007).

87 Sea and Water (2007).

88 Berntsen (2004), Fuglestvedt (2006), Fuglestvedt *et al.* (2008); IPCC brings out, that the negative net effect is possible but uncertain; see Kahn *et al.* 2007, p.331.

89 The new agreements to reduce emissions in the shipping sector indicate that the willingness to make sacrifices is weakening, see, e.g. Sea and Water (2007), WBCSD (2002), pp.6–21.

90 Fuglestvedt *et al.* (2008), p. 457.

that way on the catastrophic rise in sea-level.[91]

Discharges to Sea

Ships are the key factor when it comes to fouling the sea. The International Maritime Organization (IMO) has estimated that 22% of the waste discharged to sea comes from the ships. Oil spills are a severe threat to sea life and over 40% of them comes from ships.[92] There are annually 4- 5 major oil tanker accidents, in which over 700 tonnes oil is spilled, 15 medium-sized accidents and about a hundred accidents spilling under 7 tonnes oil[93]. However, only a small part of the oil discharges is caused by the accidents: the greater part of the oil spills happen in routines – while cleaning the tanks and loading and unloading the oil.[94]

Another significant ecological problem is the water that ships discharge to sea. Majority of it is so called ballast water that unladen ships carry for stability and manoeuvrability. It is taken on board at the port of departure and pumped out nearby the port of arrival, being transported annually 2–10 billion tonnes. In most cases, ballast water is mixed with oil or other pollutants. However, the biggest problem is that marine organisms are carried along with ballast water from one part of the globe to another. In the new surroundings they can cause serious ecological disturbances. Foreign species can, for example, reproduce themselves at a quick rate because their natural enemies have not been able to travel in the same ships. Well-known example is the devastating spreading of zebra mussel (*Dreissena polymorpha*) to the Great lakes of North America. In the 1980's the invasion of Dustbin-lid jellyfish (*Rhizostoma octopus)* in the Black Sea devastated the fish population. Also the warty comb jelly (*Mnemiopsis leidyi*) spread first to the Black Sea, but since 2006 it has started to spread to the Baltic and wipes out the fish population already in the Gulf of Finland. Every day in the ballast water tanks about 4 000 species are carried along from one sea to another, and every ninth week one of the sea areas receive a totally foreign organism as a resident. Additionally, organisms are carried along with the freight, too.[95]

The spread of organisms from one continent to another threats people also directly: foreign organisms either may carry pathogenic agents or be them. In 1991 an epidemic of cholera burst out in Peru; approximately 322 000 caught the illness and at least 2 900 died. Cholera had not been occurred neither in Peru nor in other parts of Latin America virtually for a hundred years. What caused the epidemic is not certain: according to one of the theories the cholera bacterium started to spread from the ballast water that a ship coming from Southern Asia discharged to the coast of Peru. In any case, it is known that several serious epidemics in the past were spread via international transport. During the last decades, for example the asian tiger mosquito (*Aedes albopictus*) has been found widely out of its natural distribution. Researchers have observed that its spread follows the

91 Hansen *et al.* (2007), pp. 1942–943.

92 WBCSD (2002), pp.6–22, Schuldt (2005).

93 ITOPF (2006).

94 WBCSD (2002), pp.6–22.

95 Lapintie (2007), WBCSD (2002), pp.6–22, OECD (1997), pp.11, 18, French (2000), p.36, *Introduced Marine Organisms: Workshop on Risks and Management Measures* (2005), Haahti *et al.* (2007) and Pajari (2007).

sea lanes. Mosquito spreads dangerous diseases, such as dengue and chikungunya fever.[96]

Air Traffic Pollution

Air cargo accounts under one percent of the total freight transport. That is why its impacts on environment are easily underestimated. However, there are two deciding factors that change the picture: 1) planes burn enormous amounts of fuel per tonne and kilometre; 2) nowadays most air traffic happens in a very sensitive layer of atmosphere, tropopause.

In air cargo, fuel consumption can be hundredfold per tonne and kilometre compared to railway and sea freight. An aeroplane burns 200–500 kilograms of fuel carrying a tonne fright 1 000 kilometres, which is 10–23 gigajoules (GJ) of energy. A full-loaded trailer truck burns 14 kilograms of diesel on open roads, in energy 0.6 GJ. A diesel train and a ship carrying containers burn approximately 5 kilograms of fuel to this same transport, in energy 0.2 GJ.[97] Respectively, carbon dioxide emissions in aviation are significantly larger than in other forms of transportation per tonne kilometre. A freight plane releases 700–1700 kilograms CO_2 per tonne and thousand kilometres while a similar marine transport causes only 20 kilograms of emission.[98]

Aviation is one of the fastest growing industries in world economy. Today, passenger air traffic grows approximately 6% annually and cargo air traffic even more rapidly. The long-term growth for air cargo is expected to be at least 6% per year which means doubling in 12 years.[99]

The carbon dioxide emissions of air traffic were approximately 2.2% of all the CO_2 emissions in the beginning of the 21st century[100]. However, aviation's effects on global warming were and are manifold. Most of the air traffic takes place at a height of about 10 kilometres in the boundary between troposphere and stratosphere. The layer is called tropopause. Rains that rinse off the emissions do not occur in tropopause.[101]

The nitric oxides of exhaust gases of jet engines and solar radiation create ozone (O_3) from the ordinary oxygen (O_2). Ozone, an important greenhouse gas, is formed in such a mass that it affects on global warming almost as much as the carbon dioxide emissions of the planes. On the other hand, nitric oxides lessen the methane content in the air, and methane is a potent greenhouse gas. Altogether, the total effect of nitric oxides is under a half of CO_2 emission impacts.[102]

Since there is very cold in the flying altitudes, the water that the exhaust gas contains turns into ice crystals and forms a visible contrail or condensation trail. These very thin and long

96 Tatem *et al.* (2006), French (2000), pp.41–47.

97 Mäkelä *et al.* (2002); figures are calculated based on Finnish data.

98 Mäkelä *et al.* (2002), Schreyer *et al.* (2004), p.133, Wolf (2007), p.349.

99 Kahn *et al.* (2007), p.334, Anderson *et al.* (2006), p.13.

100 Institut für Physik der Atmosphäre (2007).

101 Schuldt (2005).

102 Kahn *et al.* (2007), p.331, Anderson *et al.* (2006), p.10, and Fuglestvedt *et al.* (2008).

clouds warm the climate and their effect is about half of the effect of nitric oxides. According to a British study, night flights are the one to blame because on daytime the reflective effect of clouds on solar radiation compensates much of the warming effect.[103] If the air surrounding the aeroplane is really humid, the released water forms bright white cirrus clouds. There is an uncertainty about how much they are created and what are their effects: estimates range between 40% and 300% in relation to CO_2 emissions[104].

Overall, according to IPCC in 2005 the share of aeroplanes was 3% of human-made climate change excluding the cirrus clouds. When the effects of these clouds are included, the percentage rises at least up to 3.6%, probably even to 8%.[105]

The rapid growth of air traffic on one hand, and the presumable impact of emission reductions in other industries driven by climate policy, on the other, are rising air traffic's share of climate change even larger. According to the calculation of Tyndall Centre for Climate Change Research, in 2020 planes could account for half of the carbon dioxide emissions of the European Union.[106]

It is not easy to estimate how much international freight transport accounts for this climatic effect. According to the International Civil Aviation Organization (ICAO), in 1999 international freight and postal services accounted for 26% of all the passenger and freight traffic tonne kilometres.[107] Apparently, the share of energy consumption and greenhouse gas emissions were at the same scale. After that freight traffic has grown clearly faster than passenger traffic, which is why planes that carry only freight are more and more used. Freight planes do more night flights than passenger planes and consequently their climatic effect is larger.[108] Hence, international air cargo is responsible for about one third of the aviation's climate sins.

Trains, Wires and Pipelines

Comparing to the above mentioned forms of international transport, the direct environmental effects of the remaining – trains, wires and pipelines – are small. Yet locally they can be highly significant. These forms of transportation, too, kill and poison people, destroy ecosystems and have a role in consuming the biosphere.

A significant part of the international freight is carried by railway, especially in Russia. Lots of goods are transported with trains to the ports and from them. Generally, unlike passenger trains, freight trains are still pulled by diesel locomotives[109]. They release among other things fine particles and nitric oxides, dangerousness of which was treated earlier. The noise level of a train passing by is higher than of a truck, but people suffer

103 Stuber *et al.* (2005).

104 Hahn (2006), Berntsen (2004), Kahn *et al.* (2007), p.331.

105 Kahn *et al.* (2007), p.331; to be specific, the percentages have been calculated from the human-caused radiative forcing which does not correlate quite directly to the extent of climate change.

106 Anderson *et al.* (2006), p.55.

107 Calculated according to a table in International Civil Aviation Organization (2001), table 1–15, p.22.

108 Hahn (2006).

109 Fulton & Eads (2004), p.74.

from it less because it is not constant.[110] Trains account for about 1.5% of the energy consumption in traffic.[111]

Large amounts of oil and gas are transported through the pipeline systems. The flow does not happen by itself, and so at regular distances pumps or compressor stations are needed. Accordingly also pipeline transports consume energy; in 2001 approximately 2% of the total energy consumption in traffic.[112]

The pipelines are leaking regularly, and the spilled oil contaminates vast areas of land and water, and the substances that evaporate from it poison the air. For example, in 1990's 5% of the Russian oil leaked into the environment.[113]

Natural gas contains 90% methane, which is a potent greenhouse gas. In Russia and United States, two of the largest producer countries, approximately 1.5% of the natural gas leaks out into the air of the pipelines and during the different points of treatment.[114]

Pipeline systems are extremely vulnerable to accidents caused by nature or people as well as to sabotage.[115] Large amount of oil or gas can be released to environment at once with devastating effects. In the US pipeline system happened 223 accidents during just one year (1992), in which 18 millions of litres of oil and oil products were released.[116] Since 1972, merely in one pipeline that goes through Ecuador over 60 large fractures have occurred. Through them over 98 millions of litres of oil has been released into the environment.[117]

Today, large amount of electricity is transmitted from one country to another across the high voltage lines. In 2004, electricity was exported and imported approximately 550 terawatt-hours (TWh) which accounts for 3% of the worlds production. This is more than the annual usage in the whole continent of Africa.[118] According to plan, the export and import will increase significantly. In the transmission lines alternating current is being used almost exclusively. Therefore nearby them there are electric and magnetic fields, direction and intensity of which are changing rapidly, i.e. there is electromagnetic radiation. Additionally, power lines charge particles and gases around them electrically, which can strengthen the harmful effects. In many studies, people living close to the high voltage lines have been noticed to suffer from cancer; especially children's leukaemia has been shown to increase seriously. According to some researchers, in close proximity of power lines increased susceptibility to mental disorders has been found, too.[119]

---

110 OECD (1997).

111 Kahn *et al.* (2007), p.328.

112 Plouchart (2005).

113 Stammler (2000).

114 Lelieveld *et al.* (2005).

115 Lovins & Lovins (1982), pp.112–122.

116 OECD (1997), p.27.

117 Tamminen (2006), p.35.

118 IEA (2007).

119 Tamminen *et al.* (2003), pp.93–107, Draper *et al.* (2005).

The Effects of Infrastructure

Where there are no roads there is not much use for a car. A ship without ports and an aeroplane without airports are as futile. A transport system needs a complicated and wide infrastructure to operate. That, too, has various serious ecological impacts.

Production and Distribution of Oil

Excluding electric trains, high voltage lines and gas pipelines, nearly all of the energy used in transportation comes from the crude oil. Its production is as devastating as its use: oil exploration contaminates ground waters, soil and water bodies. Oil drilling and pumping itself mean a calamity for the neighbouring residents. For example, in Eastern Siberia, Ecuador and Nigeria in the vast areas populated by aboriginal people, the soil, water and air are intolerably contaminated[120].

The disasters of oil production do not only relate to the peripheries of the globe: the Department of the Interior of the United States has estimated that every single offshore oil rig in the US coastal areas has offshore, has a 14% change of causing a gigantic oil spill – and the drilling rigs of today are almost certainly to do that by the year 2030. The largest oil spills to sea in the world have not been caused by the tankers but by the oil rigs. Small spills happen constantly; merely in California during three years occurred 38 069 spills, in which 12 millions of litres was spilled to sea.[121]

In oil drilling, also other dangerous pollutants are discharged to the environment. The drill is cooled and the waste is removed with thick lubricants which contain plenty of heavy metals. In just one drilling 11 tonnes of toxic metals are discharged in the environment. According to the U.S. Environmental Agency (EPA), during a year oil rigs discharge to sea billion tonnes of drill lubricants that contain mercury, cadmium, lead and chromium, among other things.[122]

After the long and dangerous pipeline and sea transports that were discussed earlier, the crude oil finds its way to refinery. Refineries pollute the water and the air of the neighbouring areas and produce large amounts of toxic waste. Solely in the US, millions of people living within a 50 kilometres radius of the refineries are exposed to the amounts of benzene that are beyond allowable limits. People living in close vicinity to refineries get the largest amount of volatile organic compounds (VOCs) and other toxics. In the US these areas, mostly populated by coloured and the poor, have telling appellations: the area in Louisiana is called Cancer Alley and the one in Northern California is Cancer Belt.[123]

The products distilled and mixed from the crude oil are transported from the refineries in pipelines, ships and tankers. From all these, oil products are spilled in the environment both in the daily use and in accidents. The tank lorries are especially dangerous in the

120 Vella (2000), Stammler (2000), Ebeh (2000) and Iligama (2000).

121 Tamminen (2006), pp.28–29.

122 Tamminen (2006), pp.29–30.

123 Tamminen (2006), p.36.

regular traffic accidents; there is a risk of massive fires and violent explosions; significant portions of oil may spill into water bodies and soil.[124]

In petrol stations, ports and air fields, fuel is stored in large underground or overground tanks. It is common, that they spill oil products with all the toxics to soil and ground water. According to the information of petroleum industry itself, every third of the US petrol stations has contaminated either ground water or water bodies.[125]

Roads and Ways

Roads, railways, canals, pipelines and high voltage lines take a lot of land, fragment human and animal communities and cause other ecological and social problems. Frequently, they are drawn through areas that are very important in historical, cultural or ecological sense causing irreplaceable losses.

One kilometre of an ordinary newly built road entombs 3–5 hectares of field or forest.[126] In Germany it has been estimated, that traffic system accounts for 5% of the country's area.[127] But the impacts of the road do not end up here: the movement of animals is getting more difficult or it is prevented; chemical, noise and light pollution are increasing; protection of vegetation is disappearing and water flow is changing, and by these alterations the effects of the road extend dozens of kilometres further. In the US roads cover approximately one percent of the country's surface, but their effects on the nature account for 20% of the area.[128] Diverse routes, ways and lines carve the communities up to smaller and smaller parts. In the resulting fragments, biodiversity, size of the populations and the capacity to survive are reduced. Fragmentation increases the boarder areas where the microclimate is so different that many of the species do not thrive there any longer.[129]

Similarly to ecological communities, large and busy roads shatter human communities into pieces, too[130]. A neighbour and a local shop of yesterday are suddenly farther away when a motorway has been built in between. Crossing the way is both life-threatening and illegal; often acrobatics or heavy-duty tools are needed. The only alternative is to wander along kilometres in noise and pollution to the nearest tunnel or bridge over or under the motorway and back again on the other side. The new obstacles encumber especially the aged, disabled, children and other people without car. The real community based on repeated and smooth contacts breaks. It is replaced by an imagined community[131] that is created by media manipulation and controlled easily from above. Errands have to be run

124 See, e.g. Gwehenberger *et al.* (1999), Tamminen (2006), p.39.

125 Tamminen (2006), p.39.

126 Kivivuori (1991), p.102.

127 Opetusministeriö (The Finnish National Board of Education) (2007).

128 O'Meara Sheehan (2001), p.111.

129 See, e.g. OECD (1997), p.11, Surface Transportation Policy Project (2007); Of the ecological effects of a new railway on a sensitive site, see International Campaign for Tibet (2002).

130 See, e.g. WBCSD (2002), pp.6–20.

131 "Imagined community" is a concept introduced by Anderson (1991) to describe nation states, but it can be applied also to many other types of communities.

by car or other vehicle and traffic increases again.

Building and maintaining roads and other traffic routes is a huge effort. A myriad of earth-movers, rolls and asphalt paving machines are constantly on the run changing the forms and composition of the surface. Their diesel engines release into the air large amount of pollutants. When these are divided between the road users, the emission amount of every vehicle increases significantly. This relates especially to trucks, because they wear the roads out of proportion to their number. For example in the US, freight traffic accounts for 40% of the road disintegration.[132] In European Union as well as in many other areas it accounts for more, because the roads are widely more used in transport of goods than in the US.[133]

In the US the emissions of trucks to air have been calculated for the whole of their life cycle. In comparison to mere exhaust gas, the constructing and using of infrastructure increases carbon dioxide emissions approximately 20%. For some emissions, the addition is even much larger. Infrastructure operations release sulphur dioxide in same amounts as exhaust pipes; ratio is approximately 0.7. Particulate emissions are expressly dominated by building and maintaining of the roads; these operations release 4.5 times more harmful particles than the truck engines.[134]

Airports and Harbours

The swelling of international transport of goods has demanded building of countless new harbours and extending the old ones. At the moment, especially the harbours that are specialized in handling the containers are being enlarged. According to Hamburg Institute of International Economics (HWWA), until the year 2030 the freight amounts in European harbours will double, while the container traffic increase over sixfold.[135] The building and maintaining of harbours and shipping lanes related to them need dredging to an enormous extent. Dredging accounts for 80–90% of all the submersed material, and 10% of it is toxic with high contents of heavy metals, oil components and pesticides.[136]

In order to enable the increase in air traffic, new airfields have been built and the old ones extended. Rarely used military and other airfields have been transformed to serve commercial aviation.[137] In 2006 there were 49 024 airfields in the world,[138] from which certainly only a small part serve international traffic directly.

An airport spoils its environment widely with noise, pollution and the busy road traffic

132 Facanha & Horvath (2006), p.233.

133 See, e.g. Wolf (2007).

134 Facanha & Horvath (2007), p.7141. The increases of CO_2 and other emissions presented here and in the following, raise the total emissions of international transport respectively. Yet, they do not raise the total emissions in such large percentages, because the increase of a single vehicle emission contains the transports needed to build and maintain the infrastructure, which are already calculated in the total emission figures of transportation.

135 Wolf (2007), p.278.

136 WBCSD (2002), pp.6–22.

137 See, e.g. Hahn (2006).

138 The Central Intelligence Agency (2007).

related to the operations that it requires[139]. An international airport is one of the largest individual sources of nitric oxides, volatile organic compounds and many other emissions in various metropolitan areas.[140]

Building and maintaining airports, as well as loading and unloading the cargo increase the total emissions significantly. According to the US study, in comparison with mere exhaust gas emissions, carbon dioxide emissions increase approximately 10% and nitric oxide emissions approximately 30% when these infrastructure operations are taken into account. The same correction increases particulate emissions, carbon monoxide and sulphur dioxide emissions enormously: an air freight tonnage wrecks the environment with over twentyfold PM_{10}, fourfold CO and about fourfold SO_2 emissions. These large infrastructure emissions are the consequence not only of the airport construction but also of the numerous trucks bustling at the existing airports and releasing extremely dirty exhaust gas.[141]

139 See, e.g. OECD (1997), p.20.

140 WBCSD (2002), pp.5–19.

141 Facanha & Horvath (2007), pp.7140–141.

Indirect Effects of Transportation

The direct effects of vehicles and infrastructure are, however, just a beginning for the tragedy created by the transport system. The production of transport equipment and the acquisition of materials and industrial products that infrastructure demands should also be examined. It is also important to take notice of what happens with the means of transport and infrastructure after usage. All this has numerous negative ecological and societal consequences. Even the social maintenance of transport system has environmental and societal implications. The same pertains to the enormous streams of material spawned by transports. This for its part promotes decisively the production in capitalist economy which has huge negative ecological consequences. Naturally, these consequences mingle with the impacts of our whole industrial system, but that does not make them any better or excuse those responsible.

Manufacturing and Maintenance, Raw Materials and Waste

The manufacturing of modern cars, aeroplanes and ships is a very complicated global process. Hundreds of natural raw materials are needed, as well as a myriad of industrial materials, components, tools and machines which are produced and manufactured in different parts of the world. This consumes an huge amount of natural resources, produces greenhouse gases, intoxicates people and contaminates the air, water and soil. Even before a vehicle has taken its first load, it has already cut a swathe through mines, coal power plants, blast furnaces, foundries, rolling mills, sweatshops and factories.

Vehicles do not move for long if they are not serviced and repaired regularly. This needs many agents, instruments and transports, whose production pollutes the globe.

As in the case of infrastructure discussed above, taking into account the manufacturing process increases significantly the total emissions of transport systems. Particularly in the case of aeroplanes, the overhaul affects significantly into the emission load. According to the study related to the US, the manufacturing and service of trucks increase the carbon dioxide emissions calculated in road transport per tonne kilometre up to 15% in comparison with plain exhaust gas emissions. The corresponding figure for air freight is 25%. Manufacturing increases the particulate emissions in road transport 25% and in air transport no less than 360%. Manufacturing and overhaul increase also significantly the sulphur dioxide and carbon monoxide emissions; both in truck and air traffic they more than double.[142]

These figures are based on the emissions of US factories and mines. Since in the poor countries emissions are larger and taking into account that a large part of the raw materials and semi-finished products used in the manufacturing of cars and aeroplanes come from these countries, average air freight and land transport release pollutants even more.

The quoted numerical figures in this and in the infrastructure paragraph are based on

142 Facanha & Horvath (2007), pp.7140–141.

various hypotheses and are just indicative. However, the scale seems to be right, since many of the studies related to the life cycle of a private car end up to similar results.[143]

A large amount of the above-mentioned gaseous emissions have their source in the mining and refining of iron, aluminium, copper and other raw materials needed for the vehicle in question. For example, steel production requires mountains of coal and limestone and releases into the air a great deal of sulphur dioxide. Quarrying of bauxite, which is used as a raw material for aluminium, leads to the destruction of large land areas. Bauxite processing takes lots of electricity and it has led to harnessing of many rivers. Major part of the solid waste stays in the mining and ore processing localities. Regarding to a passenger car these waste amounts have been calculated. A car that weights under 2 tonnes leaves behind 25 tonnes of waste in the mine localities and elsewhere, from which approximately four tonnes is hazardous waste.[144]

The means of transport do not stop polluting even when they are not in use any more. Even if the valuable metal is recycled, hundreds of kilograms of solid waste is left over. In recycling process large amount of greenhouse gases and toxics are released into the air. For example, of the car's whole life cycle waste disposal accounts for 10% of its nitric oxide and dust emissions.[145]

The building of roads, car parks and other transport lanes and terminals eat up a massive amount of materials whose acquisition have large environmental effects. For example in Britain, 150 000 tonnes of sand and gravel is needed to build one kilometre of motorway. About a half of the production of Finland's countless gravel pits and rock crushing plants goes to building and maintenance of the roads. All around the Europe these sand piles are scrabbled around from various areas that are ecologically sensitive, such as the bottoms of drivers.[146]

Social Requirements

The vast and devastating international transport system and its infrastructure, described above, do not work without people despite the use of complicated technology. Behind the wheel, rudder and control stick is always a person. Likewise asphalt paving machines, loading shovels, excavators, boring machines, oil pumps, cracking plants, blast furnaces, rolling mills, machine tools, lathes, cutters, saws, welding machines, paint sprayers and a myriad of other instruments and machines are used by real people. Why do these people agree to labour despite of all the damages it causes? On a second thought it looks bizarre; majority of these employees are decent citizens who do not wish to harm anybody, not to speak about damaging the whole humanity or the earth. The matter gets even more strange, as the pollutants that they spread in their work harm themselves the most. According to a study, inside the car the concentrations of various exhaust gas emissions

143 See, e.g. Klemola (2007), Klemola (2006), Teufel *et al.* (1999) and MacLean & Lave (1998).

144 Teufel *et al.* (1999), MacLean & Lave (1998), World Carfree Network (2007), and Bunker (1994).

145 Teufel *et al.* (1999), p.14.

146 World Carfree Network (2007), Kivivuori (1991).

are tenfold compared with outside.[147] Drilling, digging and mining the oil, metals and other raw materials cause the greatest health damage to the employees. Mine work and oil drilling belong to world's most dangerous occupations.[148]

On the other hand, it may be wondered why other people let these workers continue to execute this destructive activity at all. Why also in those cases when the activity is opposed, the resistance often fails so that the endangering of people and the globe goes still on?

Information Blockages

The questions asked above have a simple answer; both the employees and other people are lacking information and power. Essentially, the reason for this is obvious but usually skirted around in the prevailing discourse: some people do have plenty of power. Despite much rhetoric we do not live in a republic neither in a democracy but in an oligarchy.

There are a lot of research material of the dangers of our transport system to its employees and other people. The material is in most cases nearly unquestioned, but it has been submerged so deep in the ocean of information that one has to make an effort to dig it out – a fact that the author has found out himself. Currently, people are targeted with an enormous stream of media messages but most of the life essential information is marginalized. Commercial messages which strive to sell a product by associating positive images to it, mostly on subconscious level, dominate the stream. Essential information of the quality of products or their environmental effects are not told. Other mainstream media content serves, on one hand, as a framework and decoy-duck for evocative manipulation: on the other hand it strives to justify the concentration of power to the companies that sell the advertised products, to other external bodies and to media companies themselves.[149]

Yet the increase in the number of sicknesses and the deterioration of the environment can be so evident that even the best media manipulation cannot prevent seeing them. However, people may continue the destructive activity because they are paid for it, and other paid work or subsistence that would be less destructive is unavailable. Additionally, the living of many outsiders may become more difficult if they interfere in the destruction that the others are performing.

Also in the case that one person is able or dares to leave his destructive job, it does not really have any impact, because there are other people queuing to replace him – people who are not aware of the destruction or who have financial woes. It is also probable that the efforts to spread information or to protest by a single outsider are drowned by the media churn.

147 Tamminen 2006, p.21.

148 See, e.g. Millen & Holtz (2000), p.201, O'Rourke & Connolly (2003) and Plowright (2006).

149 See, e.g. Chomsky (1989), Tammilehto (1998), Carey (1997), Leiss (1978) and McCracken (1988).

Allured by a Pyramid Scheme

No doubt results are attainable if a group of people cooperates. But the social relations that are broadly known as power structures, are operating expressly to complicate or impede that. The most essential of them is hierarchy, in which the ensemble of influence relations has been organized into a form of a pyramid. The orders of general director go to lower directors and forward to the next layer of directors and so on, until they reach the floor level. The information also is to be transmitted mainly in vertical direction. In a pyramid structure, the lower levels of people with their daily routines are constructing to the upper levels the authority and power that is used against the same people. As a result, an obstructive person feels that the whole extensive organization is against him, although in reality majority within it would be on his side.

Naturally, horizontal communication would change the situation, but it is prevented or encumbered in every way. Some of these methods are job splitting, shift arrangements, structural changes in technology, architecture and community as well as prohibition, restriction and bureaucratization of trade union and community activities.[150]

Money Talks

Another important structure of today is the market. The results of cooperation between humans and interaction with nature – often centuries long – are reduced to commodities of which money can buy an unlimited ownership. The effort and suffering of a myriad of people and creatures in the production of goods is set aside. *I get the goods thanks to me, because I pay for it. For example, the food on my table is neither supplied by the growers nor the food and transport workers, but me, myself.* A well-to-do person just looks like to have more capability to supply than average. For a gaze situated outside the market, he would look like a creature who owns a large group of slaves making other people to realize his most frivolous whims with the help of his power. Similarly to hierarchy the market structure makes the importance of human cooperation obscure in the production of power that subjugates them. However, there is a difference because the markets veil not only the way how the power is created but also its existence.[151]

On the other hand, most of the people get money to buy the goods just by getting a paid work in hierarchic and undemocratic organizations. There they make money for themselves in a first place, and that is why it is mostly just an unessential point what kind of products they are making, what kind of services they are doing and under which conditions all that is happening. How these people take part in constructing the organization and the power is in shadow, too. The largest part of waking hours, energy and ability of the people are, as it were, transformed into goods that are handed over for the organization’s free use to get other goods.

The market structure affects in two ways on people struggling against the destructions

150 See, eg. Dickson (1974), Foucault (1977) and Tammilehto (1998).

151 For discussions of treating the nature of markets from about the same point of view see, e.g. Holloway (2002), Tammilehto (2005c), Rubin (1972) and so called “ theory of commodity fetishism”, in Marx (2005), chapter I, section 4.

caused by freight transportation: firstly, they do not get enough support for their struggle because both the illusion of the monetary-based goods and the phenomenon of work-commodity obscure the other people's connection to the transports. Secondly, they have difficulties to find the people who are maintaining the transports at first hand because the domination has been transformed to an invisible hand of the markets and the connection between richness and power has been broken off.[152]

Regardless of all this, every once in a while powerful social movements arise against the construction of motorways, extension of airports, toxic transportation, oil production, appropriation of natural resources and other projects related to transport. The mainstream media has an important role in weakening the effect of movements; neither the movements nor their objectives are told about, and if so, it is made in compromising manner.

And if this does not restrain enough the growth of a movement, the last instance of power is introduced: violence. The police and secret services start to subdue the movement. In case the movement has already taken a form of a local revolt, the army arrives.

Thus, all these undemocratic power structures are prerequisite for the existence of a global transport system of today. The globalisation of economy means expansion of the transport system, and one of its consequences is the consolidation of power structures. Therefore, in addition to the tragic environmental effects global transport of goods has social consequences which are as tragic to those who value real democracy and equality. On the other hand, the lack of democracy has horrifying environmental effects: in that case ecologically irrational decisions can easily be made because the narrow power elite can always protect themselves – or imagine to do so – from the terrible effects of their decisions. The elite can get rich and foster illusions of increasing prosperity, while the life of overwhelming majority becomes more wretched as the essential source of prosperity, biosphere, pines away.

Material Flows and Their Impacts

What actually do ships, trucks, trains and aeroplanes carry from a country to another? Measured in tonnes and tonne kilometres, raw material transport accounts for the largest part of the ocean traffic. In 2004, over a half of both the transport amount (tonnes) and the performance of the transport system (tonne kilometres) were accounted for by transportation of three key products alone. Their share of the performance of the transport system was divided as follows: oil 42%, iron ore 12% and coal 11%.[153] Since a significant part of oil as well as iron ore and other raw materials is used for building, maintenance and use of the transport system, plenty of transport is done just in order to make transport possible.

---

152 This has not always been the case, as can be seen from the etymology: the English word *rich,* French word *riche*, German *reich*, Swedish *rik* and Russian *bogatyj* refer all in their original or present meaning to power; the Russian one even to divinity. English *rich* and corresponding words in other European languages derive from the Latin word *rex* meaning *a king*, see Tammilehto (2003b), p.49; see also Lummis (1996), p.70.

153 Karhunen & Ernvall (2007), pp.60–61, Zachcial & Heideloff (2005), p.105.

Major part of other than raw material freight are container transports. That is also the mode of transport that swells the most, its growth rate is 10% per year. The containers are usually 9.1. or 12.2. metres long steel boxes. Diverse goods from tomato juice to computers are transported in containers. It is essential that with the help of them the transport system has been able to be integrated: goods can be moved without intermediate storage straight from a ship to a train and onwards to a truck or vice versa. This has paved the way for a just-in-time system, in which goods pass from the factory straight to the end user or retail outlet without the intermediate storage. In practice this means storing of goods in the trucks that use public roads[154] and it has only been possible by increasing the incomplete loads and transferring from railway to road transport. In consequence, it has increased the energy consumption and emission amounts significantly.[155]

Container ships account for 17% of the world's trading ships. Many of them are gigantic being able to transport over 10 000 containers at once. Because of their size they cannot sail through the Panama Canal any more; for example the container ships heading from China to the East Coast of the United States are often sailing around over half of the globe through the Red Sea, Suez Canal and Mediterranean – at the same time polluting the Middle East and Europe with their sulphur.[156]

Valuable machines and instruments, easily perishable farm products, relief supplies needed in major accidents, etc. are transported as air freight. Albeit their share is under one percent of the tonne kilometres, the value of the goods transported by air accounts for 35% of all the products in the international trade. In 2006, air freight services were sold and bought approximately for 40 billion euros.[157]

Besides the effects that were discussed relating to the transport system itself, the large and valuable flow of material and goods that stroll from one part of a globe to another have also various negative ecological and social impacts. Because most of them are noticed only when the totality of the social-ecological system is studied, they are easy to ignore and are often ignored.

Long-distance Food

All the while, more and more of the food is imported. For example, in Finland the import of raw materials for food industry has over doubled during the last two decades.[158] In Britain, half of the vegetables and 95% of the fruits are imported.[159] In between the years 1978 and 2000, the food delivery distances grew by half and the amount of air-freighted vegetables and fruits trebled. In Britain nearly 40% of all the road-bound freight transports are loaded

154 See, e.g. Wolf (2007), pp.273–76.

155 According to a British study, the Just-in-Time system has doubled the energy intensity compared with an ordinary intermadiate storage system, see Szyliowicz (2004).

156 Wolf (2007), pp.272–74, Karhunen & Ernvall (2007), p.84.

157 OECD (1997), p.19, Wolf (2007), p.294.

158 Somersalo *et al.* (2006), p.7.

159 Lau (2007).

with food.[160] It is usual today that food travels thousands of kilometres before it reaches the European or Northern American tables.

As the food is transported long distances, its persistence has to be prolonged with additives, new handling processes and with picking the fruits or vegetables when they are still unripe or green. All this weakens the quality of food and makes it more unhealthy.[161]

For the long transportation the persistence is also prolonged with packaging the food more carefully. Packings account for approximately 5% of all that we buy from the supermarkets; and in most cases their reuse is nearly impossible because there is no sense from the economic or ecological point of view to send them back to where they originally came from.[162] Thus, pollution continue to increase and the exploitation of natural resources carries on.

The long transports pose waste problems that originate from both the processing and consuming of food. The resulting waste is placed where it should not be: the processing residues would be best as forage and, ecologically speaking, the composted lavatory waste would belong in fields and vegetable gardens that have produced the food. The natural nutrient cycle is disrupted when the fields and livestock are hundreds, or even thousands of kilometres away. Big cities in Asia point out that the nutrient cycling is not utopia even in metropolises – there the lavatory waste has been taken to fields until our days.[163] Also in Europe this practice used to be common, and in Bremen it lasted until the beginning of the 20th century.[164] Whenever the nutrient cycle does not function, the water bodies become polluted with sewage, and simultaneously huge and stinking landfills that release very powerful greenhouse gas, methane, are created. For example in the US a third of mixed municipal waste consists of food casing and foodstuff waste.[165]

When food is produced far away, it is simple to take no notice of the ecological and human tragedies related to it. These tragedies are familiar to food production of today: rainforest destruction, starving families forced to move away from under large-scale farming, exploitation of land, poisoned fields, workers exposed to fumes, exhausted and underpaid people working on plantations, etc.[166]

In practice, long-distance import of food means that there are areas where a certain foodstuff is produced to a great extent. Plantation of wheat, soy, maize, oilseed rape, oil palm, banana, etc. form enormous monocultures in different parts of the world. The cultivation of a single crop of this kind is very prone to damages by pests and diseases. Thus, diverse pesticides and herbicides are used abundantly.

Ecology is not the only victim of monoculture; it is as devastating to democracy, because large-scale farming goes hand in hand with the concentration of power. In many cases, in the Global South the plantations are directly owned by the transnational corporations or

160 Halweil (2002), p.18.

161 See, e.g. Norberg-Hodge & Gorelick (2002).

162 Lau 2007.

163 See, e.g. Duncker *et al.* (2007), pp.15–17.

164 Brüggmeier & Rommelspacher (1989).

165 Halweil (2002), p.22.

166 See, e.g. Lappé *et al.* (1988), Tammilehto (1999), p.14.

the local rich. Elsewhere the control is indirect instead: the sale of inputs and the purchasing of the finished products from the farmer are under control of big companies. For example, six companies; BASF, Bayer, Dow, DuPont, Monsanto and Syngenta control 75–80% of the world trade of pesticides. These very same companies dominate also a great part of seed trade. In the US only 9% of the food price finds its way down to farmers – the rest goes into the pockets of the corporations which dominate the inputs and the marketing. The concentration of power is most effective in the international trade of agricultural commodities: for example two US companies, Cargill and Archer Daniels Midland, dominate 70–80% of the corn trade. Another two companies, Chiquita and Dole Foods, control 50% of the world trade of bananas.[167]

Ecological Debt

An interesting fact is revealed when one has a closer look at the material flows of the international transports: substantially more material, measured in tonnes, flow from poor countries to rich than to the opposite direction. Yet, as monetary trade balances are about even, this means that the rich countries import raw materials and other cheap products from the poor and export in turn industrial products and other expensive materials. For example, the trade statistics of EU demonstrate this. Between the years 1976-2000 EU's import exceeded export each year by 500–1000 million tonnes; the volume of import was 3 to 5 times more than that of export. However, measured in money import and export were equal on average; the import surplus was merely 22% even at its maximum. The import value per kg was 0.2–0.7 euros, while the export value was 0.7–2.2 euros.[168]

Centuries long distortion in trade relations between the Global South and North is one reason for the emergence and continuation of the misery in the South – a lot has been written on this matter.[169] The ecological side of the subject has drawn less attention. Producing large amounts of materials and having other activity aiming at exporting have consumed much more natural resources and have inflicted much more environmental problems in the South than similar activity in the North. The ecological costs of the economy and the whole lifestyle based on such a massive material consumption have systematically shifted to be paid by the poor people and nature of the South. The ecological debt is growing.[170]

Especially large ecological debt is induced by the mining of metals. Though most of the metals are consumed in the North, half of the mining is done in the South, including the lands of indigenous peoples living inside the North. Mining and extraction of metals and minerals are extremely contaminating activities. They take approximately 10% of the world's energy consumption and produce many times more waste than all the households of the world together.[171]

---

167 Norberg-Hodge & Gorelick (2002), Action Aid (2005).

168 Schütz *et al.* (2004).

169 See, e.g. Pheisinger & Schennach (1989), UNCTAD (2002), Frank (1969), Wallerstein (1983) and Pomeranz (2000).

170 See, e.g. Simms (2005), Döppe *et al.* (2002), pp.18–19.

171 Tammilehto (1999), pp.10–11.

The tendency to run into ecological debt has only escalated during the last decades, which can be seen in material statistics of EU. Although economy was growing in 1980's and 1990's, the direct consumption of materials did not grow within the EU area. The domestic excavation and mining of raw materials did not become larger either, whereas net import of raw materials increased. Even bigger growth occurred with the "ecological rucksack" of import; that is the quantity of the natural resources needed outside EU to make the export products brought to EU. Above all, a huge amount of raw materials was brought in from Eastern Europe and Eastern Central Europe. In fact, import from traditional developing countries decreased as measured in tonnes, while the ecological rucksack got bigger for their part, too. The ecological rucksack of EU's own export has been notably smaller than of import, so that the net weight of the ecological rucksack offloaded onto shoulders of other countries has been huge and growing.[172]

When the ecological debt is taken into consideration, it is necessary to make a modification on climate change discussion. The list of sins of the North is even longer than it is portrayed in official statistics, since large part of the greenhouse gas emissions of the South is related with export. A study produced by OECD states that carbon dioxide emissions of e.g. Sweden, France and Japan take an increase of over 10% when the emissions related to manufacturing of import products are included.[173] Similarly, the emissions of e.g. China, Russia, Poland and Czech Republic decrease by over 10% when export is taken into account. Nonetheless, the methodology of the study underestimates the emissions, since the emissions of transports and more broadly of tertiary sector are not counted in, and because the energy efficiency and other figures influencing emission calculations are assumed to be the same as in the US.[174]

Along with the ecological rucksack the shifting of ecological burden has been measured by the share of pollution intensive goods of the total import. This kind of products make up a large and expanding portion of EU's import. Between the years 1976-2000 the share accounted for 63 to 72%. The bulk of the pollution intensive goods has arrived from the poor countries of the South and from Eastern Europe. Export offers not much compensation in this case either; import of pollution intensive goods has been 3 to 5 times larger than similar export.[175]

Although most of the ecological burden has been shifted by the means of import, the ecological debt has grown bigger also through a part of rich countries' export. Old industrial countries have exported large amounts of hazardous waste to poor countries. Though an international treaty bans such export in principle, it still goes on.[176] Besides waste, toxics are as well exported from North to South. For example, many pesticides that are forbidden in rich countries are transported to poor countries.[177]

---

172 Schütz *et al.* (2004), pp.19–38; parallel analyses of the physical trade balance in EU and other old industrialised countries; see, e.g. Döppe *et al.* (2002), Muradian & Martinez-Alier (2001).

173 To be more specific, the total CO_2 emissions of domestic consumption are more than 10% larger than of domestic production. Naturally, the latter includes also CO_2 emissions of the export, see Ahmad & Wyckoff (2003), p.8.

174 Ahmad & Wyckoff (2003), pp.18–19.

175 Schütz *et al.* (2004), pp.29–40.

176 Tammilehto (1999), p.20, French (2000), pp.72–75, Basel Action Network (2007).

177 Tammilehto (1999), p.20, French (2000), pp.76–81.

Thus, one essential impact of international transport system is to shift the overuse of natural resources and contamination from North to South. When raw materials and goods are moved from the poor areas to the rich areas, the ecological burden moves the other way round. This way it is easier to continue the lifestyle and form of economy based on vast and ever-growing consumption in rich countries.[178] Economists together with others involved in academic circles may construct theories stating that after economic "development" has reached a certain point the ecological problems are going to decrease almost automatically.[179]

What goes with the shifting of environmental burden, goes also with working environment and conditions. In Europe and North America the increase in so called living standards seems to make an end of low-paying jobs in dangerous and wretched conditions. In reality they have just been shifted out of sight; by transport of goods to poor countries and by transport of people into patches of South inside North.[180]

Hence, the global transport system releases the economy dominated by the North to act without human and ecological restraints. The rich can carry on getting even richer.

Concentration of Power

The shifting of ecological burden from North to South is not only affecting the health and environment of the people of the South but also their economics. The utilization of fields, forests, water resources, land areas as well as human energy and skills to serve directly or indirectly the exports is a loss for local economy. Moreover, the self-sufficient way of living that has supported a myriad of people for millennia becomes more difficult or entirely impossible. The compensation for the use of natural and human riches is so small and so unevenly and unjustly distributed that large number of people are to become wretched.[181]

In both South and North long-distance transports facilitate the concentration of production and commerce and displaces small producers and stores. Since in no single place productive resources and customers are abundant, the large production units and the retail trade chains based on the concentration of supply are possible only due to wide-ranging transport network. With their large resources and use of manipulative marketing methods, pricing policy and political relations they can easily beat small and independent production units and shops.[182] Thus, the economic power is increased and more concentrated.

Economic power centres are never acting separately from other aspects of society. They push through their goals by forming close relations to both national and transnational bureaucracy and political organizations.[183] Hence, the whole society gets corrupted and turns out to be more undemocratic.

---

178 For discussion of the "rich-country illusion" see Andersson & Lindroth (2001).

179 Empirical criticism against this theory, so called "Ecological Kuznets Curve", see Seppälä *et al.* (2001), Fischer-Kowalski & Amann (2001).

180 For discussions of the working conditions in South see, e.g. Korten (1995), pp.229–37, Greider (1998), pp.333–56.

181 I have treated this subject broadly in my study entitled "Globalisation and Dimensions of Poverty" (2003b), which also has plenty of references related to this topic.

182 See, e.g. Korten (1995), pp.207–14, Goodwin *et al.* (2003), p.9.

The global transport network affects not only indirectly, but also more directly to concentration of political power. The network makes it easier to keep up the concentrated regional and global governance and to execute military operations supporting the power system.[184]

The concentration of power is both a prerequisite for and also a consequence of global transport network. Anyway, when it comes to the symbiosis of domination with transport system it is essential to notice that the parties are quite dissimilar entities. The power as a social relation is a fickle affair; in favourable conditions it may flourish quickly, but it may languish just as quickly. In contrast, the transport network is more permanent, especially for its infrastructure – once build it won't just disappear in a moment. Thus, the global traffic system, as well as all technology that supports those in power, is stabilizing the sway; it leads in a way to petrification of social relations.[185]

All the social effects presented above have impacts of their own. Yet in all studies the chains of interrelations must be broken in some point. However, may it be mentioned, that societal impacts have environmental effects, which might in many cases be even larger than direct ecological consequences. For example, the concentration of power changes the priorities of the societal elite in the way that maintaining the hold of power and struggling for it are always put first. So for example the Millennium Development Goals agreed in 2000 by the leaders of all nations are in danger to turn out to be a mere purple prose. It appears, that aims "to halve, by the year 2015, the proportion of the world's people whose income is less than one dollar a day and the proportion of people who suffer from hunger" and "ensure environmental sustainability" will be attained only by sweetening concepts are statistics just right.[186]

183 See, e.g. Robinson (2004), Sklair (2002), Jänicke (1990), Ruostetsaari (1992), Balanya *et al.* (1997), Tammilehto (2005a), Tammilehto (1998) and Tammilehto (1994).

184 On importance of roads in centralized administration, see, e.g. Uusitalo (1991), Mumford (1966) and Tammilehto (1998).

185 For a discussion of "Petrification of power", see e.g. Mumford (1966), Mumford (1938), Foucault (1977) Hartmann (1981) Kvaløy (1976), Kvaløy (1992) and Tammilehto (1998), pp.192–200.

186 The United Nations (2007), Criticism on the statistics used in following the attainment of the goal of halving poverty, see Tammilehto (2003a), Tammilehto (2003b) with the sources mentioned in both.

Why All This Trouble of Transportation?

So why does all this massive moving of goods and materials from country to another take place after all? More or less direct answers have already been given above. To understand better the character of the international transport system some generally offered explanations are to be dealt with next.

Welfare or Illfare?

It is commonly held as self-evident that the global transport net is needed to sustain and foster human welfare. For example, according to the Intergovernmental Panel on Climate Change (IPCC) transport activity is a ”key component of economic development and human welfare”. And so the IPCC’s working group which considered the mitigation of climate change concluded that the transports cannot be brought down. On the contrary, the group sees clearly that ”transport activity will continue to grow at a rapid pace for the foreseeable future”.[187]

In this reasoning, or “unreasoning”, it is believed that international trade is going to lead to economic growth or development and this would automatically improve people’s welfare. Facts shown earlier together with large number of other empirical and theoretical material make these beliefs quite unconvincing.

Comparative Advantage?

Let us first take a look at the connections between transportation and economic development.

As mentioned earlier, the international trade often stands for the situation, in which the rich take the possession of the resources needed for the economic activities of the poor, and at the same time all the disadvantages resulting from the operations of the strong are passed down to become the burden of the weak. Although this apparently gives advantage to the better off, one may well ask how could this kind of practice possibly benefit the general economic development?

While the global empirical gaze is not so willing to support the interconnectedness of trade and development, a theory is introduced: *the principle of comparative advantage*. The theory was first presented in 1817 by David Ricardo, who had made a fortune by speculating on the stock exchange. By this principle every nation should specialize in manufacturing products that are most efficiently produced within its own economy, whereas other products should be acquired by exchange. According to this theory, also the nations with nothing to be produced more inexpensively than elsewhere should carry on trading; one should simply specialize in the field that is the least unpropitious. These theoretical conclusions are valid only if the following assumptions are true:

187 Kahn *et al.* (2007), pp. 325, 330

1. Full employment prevails.
2. Land, labour and capital are movable from one sector to another without any large expenses.
3. No shifting of capital from one land to another.
4. Comparative advantages arise from the country's natural conditions and they cannot be deliberately generated.
5. Maximization of conventionally measured national income regardless of its distribution is always prior to all the other goals of economic policy.[188]

In the world of today these assumptions are practically never true. Thus, the principle of comparative advantage is of merit merely as propaganda and as a theoretical exercise.

Is Economic Growth Decisive?

The latter part of the welfare explanation of transportation, saying "growth leads to welfare" is just as controversial. Since the majority of us gets illnesses, a ruined environment and ravaged future as free gifts alongside the bargain of growth or trade, how is it possible to talk about general welfare? In this point, the defenders of the argument suggest that it is growth or trade explicitly that provide the resources needed to improve the environment. In this reasoning it is assumed that the environmental problems are marginal and not structurally related to the character of today's economy. Yet, examining just one of the environmental problems, the climate change, proves the assumption wrong. Problems have been externalized and the ecological debt has been allowed to grow for centuries. The structures of our modern societies and of international trade are based precisely on that. Since externalizing environmental and other costs is precisely the factor that enables the economic growth, environmental problems are solved with this growth decisively less than are produced by it. If a real improvement in ecology were the priority, the growth would stop or turn into negative, and the whole pattern of thought would lose its foundations.[189]

Those believing in the blessing of growth are misled by the illusion of the progress in solving the ecological problems in old-established industrialized countries. Actually, as it was discussed above, the problems have often just been swept under the carpet by exporting them to South. The delusion gets back up also by the fact that in the public eye there is only a few symptoms of the whole dreadfulness of the global ecological crisis at a time. On the other hand, the problems around the new production methods and products – like cellular phones, genetic engineering, nanotechnology and new chemical substances – have been successfully managed to keep away from the mainstream media by the well-oiled public relations activity.[190]

---

188 See, e.g. Stretton (2000), p.666 et seq., Airaksinen (2003), pp.22–23 and Røpke (1994).

189 See, e.g. Røpke (1994), Tammilehto 1998, pp.18–42.

190 For discussions of health and environmental problems caused by mobile telephones; see, e.g. Firstenberg (2004), Nordstrom (2004) and Hänninen *et al.* (2007); Of genetic tehnology similarly, see Smith (2005); and of nanotechnology, see ETC Group (2003).

Furthermore, the belief in interconnectedness of transportation and welfare is discredited by the fact that a great deal of the transports are totally futile. Very often the same kind of products are both exported and imported.[191] For example, in year 2006 Britain exported and imported 14 000 tons of chocolate-coated wafers. In addition, 1 000 tons of similar wafers were exported without being traded for foreign wafers.[192] Britain also exports hundreds of millions of tons of milk, pork, lamb and other basic groceries, which are traded for similar amounts of foreign products of exact the same quality.[193]

Again, one may ask what kind of welfare is brought by the goods that are thrown away after a short and uninterested usage. According to a research, half or even three quarters of the material that industrialized economies absorb from nature is being returned to nature as waste in no later than in a year.[194]

Goods and Needs

Furthermore, behind the welfare explanation stands a naive view of a connection between the purchased goods and the human needs: as a person voluntarily buys a new product, it must improve his welfare. However, in a consumer society only a few purchases are related to getting food, shelter, warmth, etc. Products are bought for two reasons: firstly, because the structures of society have been altered in a way that it is hard to survive without certain belongings. For example, usually the only way to make a living is to have a paid job, and to get and to hang onto it requires often that one must own a car.

Secondly, commodities are acquired because commercial culture and advertising have attached to them – often merely in subconscious level – a variety of cultural and social connotations: strength, beauty, creativity, know-how, reliability, intelligence, social competence, masculinity, femininity, sexuality, naturalness, experience of nature, membership of some societal group, position of power, etc. Consequently, the goods in a shop window resemble ancient relics – the mere materialistic features do not explain their attraction. Generally, the things these connotations hint cannot be acquired by purchasing the goods, to be sure, and that leads to frustration. The frustration is increased by the fact that advertisements will quite quickly shift those connotations to new products, which are too expensive to acquire, at least at once.

Ergo, the consumerist society impregnated with advertising is based not on creating satisfaction but actually dissatisfaction. It nourishes illfare.[195] One testimony for this is the almost pandemic tendency towards depression, anxiety and other psychic symptoms.[196]

---

191 See, e.g. Lucas (2001).

192 Lau (2007).

193 Halweil (2002), p.21, Lucas (2001).

194 Matthews *et al.* (2000), p.xi.

195 See, e.g. Leiss (1978), McCracken (1988), Carey (1997), Chomsky (1989) and Tammilehto (1998), pp.144–45, 164–65.

196 See, e.g. Cato (2006), p.41, Levine (2007). It is not suggested here that the only reason for the symptoms would be evocative advertising.

Depending on Subsidies

The welfare explanation is frequently associated with the idea that in the system based on importing goods from long distances the prices get lower and therefore the customer gets more commodities for his money. Actually, the prices of many products have come down. This has been achieved by the utilization of underpaid labour working in life-threatening circumstances, but also by the fall in the transportation costs. In the beginning of the 21st century sea cargo was 70% cheaper and air cargo 50% cheaper than 20 years earlier.[197]

However, it is essential to notice, that transports are cheap because they are subsidized in many ways. It is estimated, that in the middle of 1990's passenger and freight traffic were globally subsidized by 225 billion of dollars, which accounts for approximately one percent of the world's GDP. Subsidies had an effect on at least 40% of world trade.[198] For example, airports are generally tax paid, and most of the major airlines are originally established with public funds. Boeing and Airbus, virtually the only companies manufacturing civilian aircraft, do construct also plenty of military aircraft and so they receive considerable governmental subsidies.[199]

Along with straight financial subventions the international transport is supported indirectly in many ways. For instance, it is common that the freight traffic is very lightly or not taxed at all. It means that private citizens and local companies competing with long distance goods are those to finance the needed infrastructure as taxpayers. The aviation enjoys the biggest tax advantages: besides airlines, also airports and aeroplane industry pay low or nil taxes. Even aviation fuel is not burdened by taxation at all.[200] Same goes to oil used by ocean liners.[201]

Additionally, the subvention is often executed so that passenger traffic using the same system pays taxes while freight traffic does not. Thus e.g. the passengers in intercontinental flights are obliged to subsidize the freight carried along in the same plane. Even bigger subvention to transportation of goods is given by motorists, whose tax payments largely cover the damages caused continuously to road surfaces by heavy vehicles.[202]

The many ways how environment is ravaged by freight traffic has been widely dealt with above. The fact that this is allowed to happen can be seen as one kind of subvention, actually by far the biggest. The externalizing of expenses by contaminating the environment is an ongoing occurrence in large scale throughout the whole industrialized system. Though this general subvention is most important in international transports, the branch enjoys many special types of subsidies, too. For example, the noxious lead is still used in aviation fuel, while lead-free petrol has been commonly used in cars since

197 Halweil (2002), p.18, Garnreiter (2006), p.24.

198 Kahn *et al.* (2007), p.378.

199 Wolf (2007), pp.296–301.

200 T&E & CAN Europe (2006), European Environment Agency (2006).

201 Koplow *et al.* (2007).

202 See, e.g. Böge (1996), pp.8–9, Wolf (2007), p.200.

1980's.[203] As mentioned before, cargo vessels are allowed to use bunker oil containing plenty of sulphur and other toxics, although the sulphur content in diesel and other fuels is restricted heavily inside EU and in many other countries. Sea and air traffic have not been included in Kyoto Protocol's emission reduction obligations, though the Protocol does not even stipulate any sizable reduction in greenhouse gas emissions.[204]

Thus, with the huge support system transportation costs are kept low in order to keep the global economy operating as this far. Its present operation is said to bring welfare for people everywhere, but actually it brings illfare to both South and North. The question is, what could possibly be the point of all this?

Empire?

To find a possible hidden rationality, it is helpful to move back in time and investigate an earlier system based on long-distance transportation, the British Empire. It seems obvious that building of this empire aimed at profiting the mother country, but many studies indicate that in reality it was unprofitable: it took more than it gave.[205] So why was this empire put up in the first place? In order to see the apparent answer to this question, it is important to break away from the general illusion that states promote common good. In fact they have generally advocated interests of certain groups, usually those of the rich. This was already noticed by Adam Smith, the founder of political economy and a keystone figure in prevailing thought. He could not accept the influence that "moneyed men" had in government affairs, because the interest of those making their living from profits "is always in some respects different from, and even opposite to, that of the public"; dealers and manufacturers "have generally an interest to deceive and even to oppress the public, and who accordingly have, upon many occasions, both deceived and oppressed it". [206]

The British Empire was created in order for certain quarters to profit enormously from it and these quarters were able to manipulate the state.[207] Thus, it is well understandable that the transport system maintaining the Empire was generously supported from the coffers of government and the colonial offices. First and foremost the support was used for the army and navy which were needed for upholding the colonial power and the occupancy over transportation routes, but there was also a straight support to transportation infrastructure. The latter was seen justified also because it helped in turn the

203 Tamminen (2006), p.43.

204 See, e.g. Berntsen (2004). Aviation will be included into rather insignificant EU's emission trading scheme, but not until 2012; see, e.g. YLE (2007).

205 See, e.g. Kurz (1999), and Parenti (1995), pp.47–50. These studies refer to the final stages of the British Empire, when the military protection and administration of all the conquered colonies demanded enormous resources. However, in the beginning of industrial development, the tilled and forested area increase provided, *de facto*, by the conquer of America was essential in order for the industry to be able to harness the people and land of the British Isles for its service, see Pomeranz (2000).

206 Smith (1937), pp.248–250.

207 See, e.g. Parenti (1995), pp.47–50.

operations carried out by the army and navy.[208]

China has recently completed the railway connecting the mother country and Tibet. Due to the challenging geography the project has become very expensive and ecologically disastrous. The placard hung over the railway says: ”Building happiness for the people in Qinghai and Tibet.” Jiang Zemin, serving as General Secretary of the Communist Party of China from 1989 to 2002, expressed perhaps the more plausible reason for building the track: ”Some people advised me not to go ahead with this project because it is not commercially viable. I said this is a political decision...”[209] Most evidently the railway makes it easier to control Tibet, to change the population base, to execute military operations and to exploit the region economically.

Yet, the British Empire is history and the sphere of Chinese empire lies far from us. So, what is the point in referring to them when trying to understand the international transport system?

The Transnational Upper Class?

In the present so called free world there are circles whose interest “is always in some respects different from, and even opposite to, that of the public”. These benefit enormously from the international transports and are able to manipulate governments to foster transport system and to cut the expenses of transports. First of all these quarters consist of multinational corporations and financial circles which support and fund corporations. They are controlling the current global economy. For example, 80% of industrial products are manufactured by the 1 000 most largest corporations, which also dominate 70% of world trade.[210]

A large group of people profits from the operations of the multinational corporations or identifies with those. However, these people constitute a minuscule minority of all people. They include the owners and managers of corporations, technical elite, transnational bureaucrats, leading mainstream media journalists and also an important part of national bureaucratic and political elites. Global structures bring plenty of money and power to them. Some sociologists have started to talk about the existence of transnational capitalist class.[211]

This transnational elite or class is unified by shared ideologies and discourses but also by various unofficial organizations resembling social clubs. Members of the elite operating in different cities are bonded by 12 000 chambers of commerce throughout the world and by

208 For discussions of building railways in British colonies for commercial and military purposes; see, e.g. Luscombe (2007), Wolf (2007), pp.94–97.

209 International Campaign for Tibet (2002), Sither (2005).

210 Mayer *et al.* (2007), p.7, see also Korten (1995), Madeley (1999), and Heerings (1995).

211 On transnational capitalist class see, e.g. Sklair (2002), pp.98–105, Robinson (2004), pp.33–84. The class is not capitalist because all its members own companies but because members identify with their interests and benefit from their operations.

32 000 Rotary Clubs functioning in over 200 countries.[212] The highest levels of the elites meet each other in influential clubs such as World Economic Forum (WEF), Global Forum of Fortune magazine, International Chamber of Commerce (ICC), Trilateral Commission, Bilderberg Group, World Business Council for Sustainable Development (WBCSD) and European Round Table of Industrialists (ERT).[213] These clubs help to form the perverted elite consensus, in which piling up capital and maintaining current structures are time after time prioritized over life of mankind and the earth.

The views of “class-conscious” elite turn into official, more or less binding decisions in many organs or bodies of global administration like World Trade Organization (WTO), the World Bank, International Monetary Fund (IMF), regional development banks, several organizations of UN, the OECD, the European Commission and the councils of EU, as well as G7/G8 summit meetings with their steering organization.[214] These organs or bodies create a dense network that works in many ways like a state. Some sociologists have started to call it a global quasi-state or even transnational state.[215] In this state there is no trace of democracy.

The global system of power resembles in many ways the former empires. Like the Roman and British Empires, it moves natural resources and fruits of labour from subdued people and areas to centres inhabited by the elite, while disasters and tragedies are brought to periphery.[216] The pattern of freight transport dealt with above can be seen as a manifestation of this phenomenon. The correct direction and volume of the flow of resources is ensured if necessary by savage wars, just as in former empires. The oil wars in Middle East provide us a bright example.[217]

In the US – which has carried on most of the military interventions and wars required by world capitalism – many members of the dominant elite have admitted openly after the attacks of September 11, 2001 that the US has established an Empire and have started to talk about it in the positive tone. [218] Actually, the quarters responsible for planning US politics understood already during the World War II that the US is going to inherit the position the British Empire had hold earlier. The term “Grand Area” was used of the empire led by the US. In this vast area consisting of most parts of the world, it was necessary "to secure the limitation of any exercise of sovereignty by foreign nations that constitutes a threat to the minimum world area essential for the security and economic prosperity of the United States and the Western Hemisphere”.[219]

---

212 See World Chambers Network (2008), Rotary International (2008).

213 See, e.g. Sklair (2002), p.99, Gill (1990), Carroll & Carson (2003), and Balanya *et al.* (1997).

214 See, e.g. Tammilehto (1998), pp.210–35, Tammilehto (2007), Mayer *et al.* (2007), Mihevc (1995), Chossudovsky (1997), and Airaksinen (2003).

215 Robinson (2004), pp.85–144.

216 For a discussion of deforestation wherever the Roman Empire expanded, see Perlin (1989).

217 The fact that the prime motive in the Iraq war has been control of the oil, is admited now for example by the former chairman of the US Federal Reserve Alan Greenspan. In his memoirs published in autumn 2007 he writes: ”I am saddened that it is politically inconvenient to acknowledge what everyone knows: the Iraq war is largely about oil.” Paterson (2007).

218 See, e.g. Hardt (2006), Mallaby (2002) gives an example of this kind of mainstream writing.

219 Dieterich (1990), pp.83–86, Gill (1990), p.126., Shoup & Minter (2004), p.130.

Collective Imperialism

Though the military securing of the prevailing empire is mainly in the hands of the US Army, Air Force, Navy and Marine Corps, it is slightly misleading to call it the Empire of the US. On one hand, the majority of the Americans do not accept the current foreign policy,[220] and in many ways building of the empire is causing damage to them. On the other hand, the control of the empire is transnationally executed in other aspects than military, and elites of other "Western" countries have approved most of the interventions by the US. These interventions have benefited also the interests of transnational companies keeping their headquarters outside the US. Besides, the other core countries of today's world system often participate in US-led wars. The EU is also strongly enhancing its own military intervention capability.[221] The present case is more likely to be considered as a transnational empire or collective imperialism with leaders and looters scattered throughout the North.[222] This more or less dispersed structure does not make world power any better or less repressive, undemocratic, bloody or disastrous.

Thus, the existence of collective imperialism, transnational corporations and other power structures with the twisted set of values of the elites gives a longed-for explanation. The prevailing international transport system is maintained and extended in spite of its apparent harmfulness because it promotes the interests of the elites.

220 See, e.g. PIPA (2006).

221 See, e.g. Pflüger & Wagner (2006).

222 See, e.g. Mayer *et al.* (2007), Carroll & Carson (2003).

What Alternatives Do We Have?

As the present international transport system is being so grievous, what options do we have? If the attention is focused only on direct environmental impacts of the transportation, one easily ends up suggesting some technical solution or improvement.

Biofuels

A demand to substitute biofuels of plant origin for oil is the most popular alternative. For example, the working group set by Intergovernmental Panel on Climate Change to consider ways to cut down greenhouse gas emissions caused by traffic gave virtually only one recommendation: to increase the use of biofuels[223]. This is clearly a quasi-solution that leads out of the frying pan into the fire.

Firstly, it aims to touch only one of the many serious problems caused by transports, that is greenhouse gas emissions. Secondly, even this problem is not solved at least with the presently available biofuel technologies. The energy inputs needed to cultivation and refining of the fuel as well as the decimation of the rainforests and marshes to get soil for cultivation, with other changes in land use, lead to substantial greenhouse gas emissions that may even be as large as with the use of fossil fuels. Large scale logging operations in a rainforest may also catalyse a chain reaction causing the forest to begin to be destroyed and by that to change climate substantially.

Thirdly, growing plants for fuel decreases the already diminishing biological diversity of our planet, which may have unforeseeable consequences in the long run. Furthermore, the plants grown for fuel are food plants – or they are competing for the same arable land and other inputs with food plants – which is why the production of bioethanol and biodiesel has already led to an increase in price of food and to growing number of hungry people. In addition, when it comes to mass production of biofuel, in order to produce net energy with current technology it is required to use the arable land and cheap labour of poor countries for the benefit of the rich. This is only possible by maintaining and consolidating present imperialistic power structure.[224]

223 Kahn *et al.* (2007).

224 See, e.g. *Agrofuels, Towards a reality check in nine key areas*. (2007), Humalisto (2006), Bailey (2007), and Pimentel *et al.* (2007). The latter is a letter to the chairman of IPCC from five authoritative scientists, in which the report on biofuels is highly criticized.

Social Change

If the present international transport system would be an essential part of the machinery producing welfare, it would make sense to look for some alternative technical fixes for it. But as it is needed only for maintaining the economic system based on the exploitation of the earth and the vast majority of mankind, the alternative must be sought from the direction of social changes.

The change does not have to and should not be grounded on “The New Man”, whose set of values lies far above the horizon of a modern man. Instead it can rely on two commonly shared values: truth and democracy.

Although absolute truth is unattainable, supporting the truth as a value means that lying and misleading are not to be approved. However, the consumption of long-distance goods is based largely on systematic lying and misleading that goes by the name of advertising. The lack of rebellion against the tyranny of the corporations and global quasi-state is based on the selective news broadcasting of mainstream media and the newspeak it has adopted. In this language oligarchy is democracy, domination is taking charge of public affairs, war is peace enforcement, exploitation is economic development, colonialism is bringing democracy, imperialism is stabilization, telling lies is public relations, repeating the message of those in power is objective journalism, ecological lifestyle is poverty, creating poverty is creating jobs, etc.

Supporting democracy as a value is not the same as sanctifying the rites of voting. It is discarding tyranny and oligarchy, it is will to make one’s own decisions and to take part equally with others in decisions concerning common affairs.

One man cannot change the society – especially when it is a global society – whereas social movements can. While creating new bonds and ways of doing things together every single movement is actually changing society immediately by its mere existence. The internal communication network of a movement decrease the exposure of every activist to advertisements and media manipulation. It is also possible that within the movement a genuine democracy flourishes here and now.

Movements with particular goal to call a halt to lies represented in media and advertising and to create true democracy naturally reinforces these tendencies that exist in various movements. They may disturb advertising, establish alternative media outlets and organize locally, regionally and globally acting democratic decision-making processes parallel to official organs.

Along with building parallel society the essential task for movements dealing with media and democracy is to weaken the prevailing institutions of power and falsehood. With spread of information and with different actions the justification and support of those institutions will gradually decrease. When people withdraw their support from them, it might well happen that what young French law student Étienne de La Boétie realized already 400 year ago. In his work *The Discourse on voluntary servitude* he wrote: "I do not ask that you place hands upon the tyrant to topple him over, but simply that you support him no longer; then you will behold him, like a great Colossus whose pedestal has been

pulled away, fall of his own weight and break in pieces."[225]

Movements of the type depicted above are not mere theoretical construction; there are already plenty of such movements acting on local, regional and global level. Thus, reinforcing them and the structural change generated by them form a real alternative to the continuous existence of the disastrous international transport system of today.[226]

Shadow Society

An obvious counter-argument against these ideas of social change is to pay attention to small number of movement activists nowadays, and to claim that behaviour of the majority is always in accordance with institutions of power, and so all the structural alternatives are very unfamiliar for most of the people. In this argument, it is forgotten that the official society is only one aspect in social life. Underneath and parallel to it lies another sphere of reasoning, action and social relations.

Here this average consumer may swear at market-chain, since she must once again buy long-distance transported intoxicated tomatoes or bread full of additives. There that well-paid clerical employee may feel hatred towards his employer, who cares for corporate social responsibility only in paper; he may ponder a way to use his inside information to sabotage the corporation. Here this unemployed engineer may organize an exchange circle in her neighbourhood and then feel that for once she is doing something meaningful. There that investor may look at the history of revolutions and daydream of a new large scale social change. Here this retired teacher may be a supporting member of a solidarity group that carries on foreign trade by a sailing ship, and may gradually learn to appreciate the radical views of the group's active members.[227]

However, most important is the fact that the majority of these and those dutiful citizens, employees and consumers are also mothers and fathers. When their children are small, they produce an enormous amount of food, cleaning, care and other essential services unpaid at their households. Usually the only matter preventing them from cracking under the workload is the help given by informal circle of friends, relatives, neighbours and other parents with children of the same age.[228]

Common Wealth

Another obvious counter-argument is to refer to the decrease of the stream of material caused by lessened transports and the collapse of the institutions of power. Is it really possible to motivate the majority of the people living in high income countries to pitch for

225 La Boétie (1975), p.53.

226 For discussions of activity and possibilities of social movements; see, e.g. Tammilehto *et al.* (1989), Abramsky (2001), Foran (2002), Lummis (1996), Solnit (2004) and Graeber (2004).

227 For discussions of seeing the institutionalization of society as incomplete process which contains many conflicts; see, e.g. Holloway (2002), Tammilehto (2005b).

228 This is part of a so called "subsistence economy" which exists alongside the official economy throughout the world, see Mies & Bennholdt-Thomsen (1999), Bennholdt-Thomsen *et al.* (2001).

diminishing their own material standard of living?

In the world where transportation has been reduced to sustainable scale the people of the North would indeed consume less. But still they could be more wealthy than today. To understand this, the predominant narrow point of view in economics has to be changed to the perspective of extended economy. Then it is apparent, that apart from the wealth that some people have and others lack, we do have plenty of common wealth that is constantly generated and regenerated by private citizens, communities and nature. In addition to the commons controlled by particular communities the common wealth consists of areas and resources that are accessible by anyone. These are called public goods by economists. A part of this common wealth is produced by states,local authorities and other public entities. But even in the industrialized countries – and also in real socialism – large part of it is created in the unofficial or independent section of the society: within households, within informal trade, within artistic, political and research work done without salary, within associations, societies and social movements.

The air we breathe, the warming sun, the ability to give birth that most of the women have, wild animals and plants, most of the lakes, oceans and seas, deserts and most of the forests, towns and villages, public libraries, schools, hospitals and inexpensive public transport are concrete embodiments of material common wealth. Most of the genetic information and scientific knowledge, the open source software, local lore, conventional wisdom and common sense, folklore and large part of popular and high culture are examples of immaterial goods that build up common wealth.[229]

Conceivable World

It is possible to create an inspiring vision of a post-capitalistic society with much less transport and consumption in which there is definitely more common wealth. Although there would be little transport of people and goods, transport would still be in a key position in economics. As natural processes would not any more be seen extraeconomical, the matter carried by the winds, rivers and ocean currents along with migration of birds and other animals are to be considered prosperity bringing and meaningful phenomena.

The cargo ships sailing slowly and at long intervals would have an important mission. The arrival would be an exciting feast, in which people meet quests coming from far distances. There the presents endowed by nature and people of far away countries would be showcased and dished out. In unison, the return freight would be collected from the offerings of the partaken people. Still, the main thing would be the ritual, in which some object of value traveling around the world and carrying a fullness of meanings would be received and possessed for a limited time. The tales heard repeatedly since childhood would connect these valuables with ancient times of terror, destruction and oppression, with the triumph over those and finally with the new unity of mankind. The ritual would revitalize the new consciousness of history, where the past systems of power and

229 For discussions of common wealth as well as the extended and informal economy; see, e.g. Lummis (1996), Tammilehto (2003b), pp.49–58, Bollier (2002), Berkes (1989) and Mies & Bennholdt-Thomsen (1999).

economy would be perceived as horrible petrifications of always present vices of greed and subjugation. At the same time it would reinforce the prevailing values of democracy, mutual aid, high regard of common wealth and truthfulness.

Even in this possible world many would be occasionally seized with travel fever – especially the young people. All would not fit in the ocean-going ships, but in the hasten-slowly-society, following the reign of standardizing institutions of power, every single local area would be enormously vast and versatile. It would be full of new experiences and awaiting adventures.

Bibliography

Abramsky, Kolya (ed.) (2001): *Restructuring and resistance, diverse voices of struggle in western europe*. London, Resres books.

ACP (2001): *A History of the Panama Canal, French and American Construction Efforts*. The Panama Canal Authority Technical Resources Center,Corporate Communications Division http://www.pancanal.com/eng/history/history/

Action Aid (2005): *Power hungry, Six reasons to regulate global food corporations*. Action Aid International, Johannesburg http://www.actionaid.org.uk/wps/content/documents/power_hungry.pdf

Ahmad, Nadim & Andrew Wyckoff (2003): *Carbon Dioxide Emissions Embodied in International Trade of Goods*. STI working paper *15*, OECD, Paris

Airaksinen, Jaana (2003): *Maailmankauppaa kaikille*. Like, Helsinki

Airbus (2006): *Global Market Forecast, The future of flying, 2006-2025*. Airbus, Toulouse

Anderson, Benedict (1991): *Imagined Communities, Reflections on the Origin and Spread of Nationalism*. Verso, London

Anderson, Kevin, Alice Bows & Paul Upham (2006): *Growth scenarios for EU & UK aviation: contradictions with climate policy*. Working Paper *84*, Tyndall Centre for Climate Change Research, University of Manchester

Andersson, Jan Otto & Mattias Lindroth (2001): Ecologically unsustainable trade. *Ecological Economics*, no. 1*/37*, 113-122

Anonymous (1994): The importance of the car to the modern economy. *Aufheben*, no. 3 http://www.geocities.com/aufheben2/auf_3_roads.html#A

Anonymous (2005): *Introduced Marine Organisms: Workshop on Risks and Management Measures Trondheim, Norway 10-11 may 2004*. DN-utredning *2005-1*, Direktoratet for naturforvaltning

Anonymous (2007): *Agrofuels, Towards a reality check in nine key areas*. Biofuelwatch, Carbon Trade Watch/TNI, Corporate Europe Observatory, Econexus, Ecoropa, Grupo de Reflexión Rural, Munlochy Vigil, NOAH (Friends of the Earth Denmark), Rettet Den Regenwald, Watch Indonesia http://www.tni.org/reports/ctw/agrofuels.pdf

Bailey, Robert (2007): *Bio-fuelling Poverty: Why the EU renewable-fuel target may be disastrous for poor people*. Oxfam Briefing Note, Oxfam International, Oxford http://oxfam.intelli-direct.com/e/d.dll?m=235&url=http://www.oxfam.org/en/files/bn_biofuelling_poverty_0711.pdf/download

BAN (2007): *Toxic Trade News*. Basel Action Network, Seattle

http://www.ban.org/ban_news/index.html

Bel, Germà & Xavier Fageda (2005): *Getting There Fast: Globalization, Intercontinental Flights and Location of Headquarters*. Working Paper Series, SSRN http://ssrn.com/abstract=849165

Bennholdt-Thomsen, Veronika, Nicholas Faraclas & Claudia von Werlhof (ed.) (2001): *There is an alternative: subsistence and world-wide resistance to corporate globalization*. London, Zed Books.

Berkes, Fikret (ed.) (1989): *Common Property Resources, Ecology and Community-Based Sustainable Development*. London, Belhaven.

Berninger, Kati, Petri Tapio & Risto Willamo (1996): *Ympäristönsuojelun perusteet*. Gaudeamus, Helsinki

Berntsen, Terje (2004): The effect of transport emissions on the climate. *Cicerone*, no. 4*/2004*, http://www.cicero.uio.no/fulltext/index_e.aspx?id=3032

Bollier, David (2002): *Silent theft, The pivate plunder of our common wealth*. New York, Routledge

Braudel, Fernand (1988): *Kapitalismens dynamik*. Gidlunds, Värnamo

Brennan, Teresa (2003): *Globalization and its Terrors, Daily life in the West*. Routledge, London

Brüggmeier, Franz-Josef & Thomas Rommelspacher (1989[1987]): Einleitung. In Brüggmeier, Franz-Josef & T. Rommelspacher (ed.): *Besiegte Natur, Geschichte der Umwelt im 19. und 20. Jahrhundert*. Beck, München, 6-18

Bunker, Stephen G. (1994): Flimsy joint ventures in fragile environments. In Barham, Bradford, S. G. Bunker & D. O'Hearn (ed.): *States, firms, and raw materials, The world economy and ecology of aluminium*. The University of Wisconsin Press, Madison, 261-296

Böge, Stefanie (1996): *Freight Transport, Food Production and Consumption in the United States and Europe*. Wuppertal Paper *56*, Wuppertal Institute for Climate, Environment and Energy, Wuppertal

Böhm, Steffen, Campbell Jones, Chris Land & Matthew Paterson (2006a): Introduction: Impossiblities of automobility. In Böhm, Steffen, C. Jones, C. Land & M. Paterson (ed.): *Against Automobility*. Blackwell/Sociological Review, Oxford

Böhm, Steffen, Campbell Jones, Chris Land & Matthew Paterson (ed.) (2006b): *Against Automobility*. Blackwell/Sociological Review, Oxford.

CAN Europe & T&E (2006): *Measures to curb the climate change impacts of aviation*. European Federation for Transport and Environment & Climate Action Network Europe, Brussels

http://www.transportenvironment.org/docs/Publications/2006/2006-10_can-e_te_position_paper_aviation_impacts.pdf

Carey, Alex (1997): *Taking the risk out of democracy, Corporate propaganda versus freedom and liberty*. University of Illinois Press, Urbana

Carroll, William K. & Colin Carson (2003): Forging a New Hegemony? The Role of Transnational Policy Groups in the Network and Discourses of Global Corporate Governance. *Journal of World-Systems Research*, no. 1*/IX*, 66-102 http://jwsr.ucr.edu/archive/vol9/number1/pdf/jwsr-v9n1.pdf

Cato, Molly Scott (2006): *Market, Schmarket: Building the Post-Capitalist Economy*. New Clarion Press, Cheltenham, UK

Chomsky, Noam (1989): *Necessary Illusions, Thought control in democratic societies*. CBC Enterprises, Montréal

Chomsky, Noam (2001): *September 11th and its aftermath: Where is the world heading?*. Medialens http://www.medialens.org/articles/the_articles/articles_2001/nc_september_11.html

Chossudovsky, Michel (1997): *The globalisation of poverty: impacts of IMF and World Bank reforms*. Zed Books; TWN, London; Atlantic Highlands, N.J.; Penang, Malaysia

CIA (2007): *The World Factbook*. Central Intelligence Agency https://www.cia.gov/library/publications/the-world-factbook/fields/2053.html

Conversino, Mark J. (2007): The Spectacle of Flight: Aviation and Western Imagination, 1920-1950 (review of Robert Wohl's book). *Air & Space Power Journal*, no. Fall*/2007*, http://www.airpower.maxwell.af.mil/airchronicles/bookrev/Wohl.html

Corbett, James J. & Horst W. Koehler (2003): Updated emissions from ocean shipping. *Journal of Geophysical Research*, no. D20*/108*, 1-15

Corporate Europe Observatory (1997): *Europe, Inc., Dangerous liaisons Between EU institutions and industry*. Corporate Europe Observatory, Amsterdam

Degobert, Paul (1995): *Automobiles and Pollution*. Society of Atutomotive Engineers, Inc. Warrendale, Éditions Technip, Paris

Dickson, David (1974): *Alternative technology and the politics of technical change*. Fontana, London

Dieterich, Heinz (1990): Ironien der Weltgeschichte: Strukturparallelen zwischen Nazi-Lebensraum und Erster/Dritter Welt heute. In Höfer, Bruni, H. Dieterich & K. Meyer (ed.): *Das Fünfhundertjährige Reich, Emanzipation und lateinamerikanische Identität 1492-1992*. Medico International, Frankfurt am Main, 69-148

Draper, Gerald, Tim Vincent, Mary E. Kroll & John Swanson (2005): Childhood cancer in relation to distance from high voltage power lines in England and Wales: a case-

control study. *British Medical Journal*, no. 7503*/330*, 1290 http://www.ncbi.nih.gov/entrez/query.fcgi?cmd=retrieve&db=pubmed&dopt=abstract&list_uids=15933351

Duncker, L. C., G. N. Matsebe & N. Moilwa (2007): *The Social/Cultural Acceptability of Using Human Excreta (Faeces and Urine) for Food Production in Rural Settlements in South Africa*. WRC Report *TT 310/07*, Water Research Commission, Gezina, South Africa http://www.wrc.org.za/downloads/report%20lists/web%20rpts/agric/TT310.pdf

Döppe, Tobias, Stefan Giljum, Mark Hammer, Friedrich Hinterberger, Fred Luks, Doris Schnepf et al. (2002): *Freier Handel, nachhaltiger Handel – Ein Widerspruch? Hintergrundpapier für die Debatte um Handel und nachhaltige Entwicklung nach Johannesburg*. World Summit Papers der Heinrich-Böll-Stiftung *21*, Sustainable Europe Research Institute, Heinrich-Böll-Stiftung, Berlin

Eagleton, Terry (1991): *Ideology, An Introduction*. Verso, London

Ebeh, Charity Nenebari (2000): The Ogoni experience. In Tammilehto, Olli, P. Brusin-Niemi, S. Junttila, A. Lehmuskallio, U. Lehtinen, H. Myrttinen, J. Nissinen, M. Noland, M. Peltola & J. Sarjas (ed.): *Indigenous Peoples and Oil, Report of a seminar in Finland*. The Fourth World - First Peoples Finland, Turku, 20-23 http://www.maanystavat.fi/oil/oil_eng.html

EnviroWindows team (2006): *Tax exemption of aviation fuel*. European Environment Agency, Copenhagen http://technologies.ew.eea.europa.eu/resources/obstacles/subsidies/transport/fol022868/doc646526/

ETC (2003): *The Big Down: Atomtech - Technologies Converging at the Nano-scale*. ETC Group, Ottawa http://www.etcgroup.org/upload/publication/pdf_file/171

European Comission (2006): *Freight transport logistics in Europe*. http://europa.eu/scadplus/leg/en/lvb/l24456.htm

Eyring, V., H. W. Kohler, J. van Aardenne & A. Lauer (2005): Emissions from international shipping: 1. The last 50 years. *Journal of Geophysical Research*, no. D17305*/110*, 1-12

Facanha, Cristiano & Arpad Horvath (2006): Environmental Assessment of Freight Transportation in the U.S.. *International Journal of Life-Cycle Assessment*, no. 4*/11*, 229 – 239

Facanha, Cristiano & Arpad Horvath (2007): Evaluation of Life-Cycle Air Emission Factors of Freight Transportation. *Environmental Science and Technology*, no. 20*/41*, 7138-7144

Firstenberg, Arthur (2004): Killing Fields. *The Ecologist*, no. June*/2004*, 22-27 http://www.theecologist.org/archive_detail.asp?content_id=285

Fischer-Kowalski, Marina & Christof Amann (2001): Beyond IPAT and Kuznets Curves: Globalization as a Vital Factor in Analysing the Environmental Impact of Socio-Economic Metabolism. *Population & Environment*, no. 1*/23*, 7-47

Foran, John (ed.) (2002): *The Future of Revolutions, Rethinking Radical Change in the Age of Globalization*. Zed, London.

Foster, John Bellamy (1994): *The Vulnerable Planet, A Short Economic History of the Environment*. Monthly Review Press, New York

Fotopoulos, Takis (2002): The global 'war' of the transnational elite. *Democracy & Nature*, no. 2*/8*, 201-240

Foucault, Michel (1977): *Discipline and punish, the birth of the prison*. Penguin Books, London

Frank, André Gunder (1969): *Capitalism and underdevelopment in Latin America, Historical studies of Chile and Brazil*. Monthly Review Press, New York

French, Hilary (2000): *Vanishing Borders, Protecting the Planet in the Age of Globalization*. W.W. Norton & Comapany, New York, Worldwatch Intitute, Washington, D.C.

Friedman, Thomas L (1999): A Manifesto for the Fast World. *The New York Times Magazine*, March 28

Fuglestvedt, Jan S. (2006): Climate Impacts of Transport Systems: Chemical responses and radiative forcing. *International Conference on Transport, Atmosphere and Climate, Oxford*, CICERO, Abstract of a scientific presentation. http://www.cicero.uio.no

Fuglestvedt, Jan, Terje Berntsen, Gunnar Myhre, Kristin Rypdal & Ragnhild Bieltvedt Skeie (2008): Climate forcing from the transport sectors. *Proceeding of National Academy of Sciences of the United States of America (PNAS)*, no. 2*/105*, 454-458 http://www.pnas.org/cgi/reprint/0707486105v1

Fulton, L. & G. Eads (2004): *IEA/SMP Model Documentation and Reference Case Projection + SMP model spreadsheet*. World Business Council for Sustainable Development, Conches-Geneva http://www.wbcsd.ch

Garnreiter, Franz (2006): *Die Enteignung des Südens, Die Ausbeutung der armen Länder in der neoliberalen Globalisierung*. isw-Report *65*, Institut für sozial-ökologische Wirtschaftsforschung, München

Gill, Stephen (1990): *American hegemony and the trilateral commission*. Cambridge University Press, Cambridge

Goodwin, Frazer, Ferenc Joó, Colin Howden, Mari Jussi, Bas de Jong & Ton Sledsens (2003): *Transport and the Economy, The Myths and the Facts*. T & E *02/1*, European

Federation for Transport and Environment, Brussels & Stichting Natuur en Milieu, Utrecht

Gottdiener, Mark (2001): *Life in the Air, Surviving in the New culture of Air Travel*. Rowman & Littlefield Publishers, Lanham

Graeber, David (2004): *Fragments of an Anarchist Anthropology*. Prickly Paradigm Press, Chigaco http://www.prickly-paradigm.com/paradigm14.pdf

Greider, William (1998[1997]): *One world, ready or not, The manic logic of global capitalism*. Simon & Schuster, New York

Gribbin, John (1988): *The Hole in the Sky, Man's threat to the ozone layer*. Bantam, New York

Gwehenberger, Johann, Helmut Mayer & Andreas Matzarakis (1999): Schadenpotential über den Ausbreitungspfad Atmosphäre bei Unfällen von Gefahrguttankfahrzeugen. *Technische Überwachung*, no. 11*/40*, 52-57 http://www.mif.uni-freiburg.de/matzarakis/papers/TU_HANS.PDF

Haahti, Hannu, Maiju Lehtiniemi & Riku Lumiaro (2007): *Amerikankampamaneetti on levinnyt myös itäiselle Suomenlahdelle*. Merentutkimuslaitos http://www.fimr.fi/fi/aranda/uutiset/270.html

Hahn, Bernd (2006): *Billigfluglinien, Eine umwelwissenschaftliche Betrachtung*. Wuppertal Paper *159*, Wuppertal Institut

Halweil, Brian (2002): *Home Grown, The case for local food in a global market*. Worldwatch Paper *163*, Worldwatch Institute, Washington, D.C.

Hamer, Ed & Mark Anslow (2008): 10 reasons why organic can feed the world. *Ecologist*, no. March*/2008*, 43-46

Hansen, J., M. Sato, P. Kharecha, D.W. Lea & M. Siddall (2007): Climate change and trace gases. *Philosophical Transactions of The Royal Society A*, no. 365*/2007*, 1925-1954 http://pubs.giss.nasa.gov/abstracts/2007/Hansen_etal_2.html

Hardt, Michael (2006): From Imperialism to Empire. *The Nation*, 31.7.06 http://www.thenation.com/doc/20060731/hardt

Hartmann, Detlef (1981): *Die Alternative: Leben als Sabotage, Zur Krise der technologischen Gewalt*. IVA, Tübingen

Heerings, Hans & Ineke Zeldenrust (1995): *Elusive saviours, Transnational corporations and sustainable development*. International Books, Utrecht

Hill, Stephen (1988): *The Tragedy of Technology, Human liberation versus domination in the late twentieth century*. Pluto, Lontoo

Holloway, John (2002): *Change the World Without Taking Power, The Meaning of*

Revolution Today. Pluto Press, London

Horowitz, Joel L. & Tom Plewes (ed.) (2005): *Measuring international trade on U.S. highways*. National Academies Press, Washington, D.C..

Humalisto, Niko (2006): *Palmuöljystä biopolttoainetta - Viljelmät leviävät Kaakkois-Aasiassa*. FinnWatch, Helsinki http://www.finnwatch.org/pdf/Palmu_ljyraportti.pdf

Hänninen, Osmo, Seppo Kinnunen, Antero Kassinen, Erkki Tuormaa & Mona Nilsson (2007): *Matkapuhelinteknologia - Mitkä ovat terveysriskit?*. HouseProtector, 2007

ICAO (2001): *Civil Aviation Statistics of the World 1998-1999*. International Civil Aviation Organization, Montreal

ICT (2002): *Crossing the Line: China's Railway to Lhasa, Tibet*. International Campaign for Tibet, Washington D.C.

IEA (2007): *IEA Energy Statistics for Electricity/Heat in 2004*. http://www.iea.org/Textbase/stats/prodresult.asp?PRODUCT=Electricity/Heat

Iligama, Arturo Yumbai (2000): The war against the poor. In Tammilehto, Olli, P. Brusin-Niemi, S. Junttila, A. Lehmuskallio, U. Lehtinen, H. Myrttinen, J. Nissinen, M. Noland, M. Peltola & J. Sarjas (ed.): *Indigenous Peoples and Oil, Report of a seminar in Finland*. The Fourth World - First Peoples Finland, Turku, 27-28 http://www.maanystavat.fi/oil/oil_eng.html

Illich, Ivan (1985): *Tools for Conviviality*. Marion Boyars, London

Independent Task Force (2006): *National Security Consequences of U.S. Oil Dependency*. Task Force Report *58*, Council on Foreign Relations, New York http://www.cfr.org/content/publications/attachments/EnergyTFR.pdf

Institut für Physik der Atmosphäre (2007): *Comparing Fuel Consumption, CO2 and Other Emissions from International Shipping and Aircraft: A Summary of Recent Research Findings by Veronika Eyring and James J Corbett*. Press Release 8.3.07 http://www.pa.op.dlr.de/SeaKLIM/Fuel_Emissions_International_Shipping.html

IPCC (2007a): Summary for Policymakers. In B. Metz, O.R. Davidson, P.R. Bosch, R. Dave, L.A. Meyer (ed.): *Climate Change 2007: Mitigation. Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge University Press, Cambridge http://www.mnp.nl/ipcc/pages_media/AR4-chapters.html

IPCC (2007b): *Summary for Policymakers of the Synthesis Report of the IPCC Fourth Assessment Report*. Intergovernmental Panel on Climate Change http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr_spm.pdf

ITOPF (2006): *Oil Tanker Spill Statistics*. The International Tanker Owners Pollution Federation Ltd, London http://www.itopf.com/stats06.pdf

Johnson, Chalmers (2004): *America's Empire of Bases*. CommonDreams.org News Center http://www.commondreams.org/views04/0115-08.htm

Johnson, Chalmers (2007): *737 U.S. Military Bases = Global Empire*. AlterNet http://www.alternet.org/story/47998/?page=entire

Jänicke, Martin (1990): *State Failure, The Impotence of Politics in Industrial Society*. Polity, Cambridge

Kahn, Suzanne, Shigeki Kobayashi, Michel Beuthe, Jorge Gasca, David Greene, David S. Lee et al. (2007): Transport and its infrastructure. In B. Metz, O.R. Davidson, P.R. Bosch, R. Dave, L.A. Meyer (ed.): *Climate Change 2007: Mitigation. Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge University Press, Cambridge http://www.mnp.nl/ipcc/pages_media/AR4-chapters.html

Karhunen, Jouni & Timo Ernvall (2007): *Kansainväliset tavarakuljetukset*. Liikennetekniikan opetusmoniste *16*, Teknillinen korkeakoulu, Rakennus- ja ympäristötekniikan osasto, Liikennelaboratorio, Espoo

Kivivuori, Osmo (1991): Autoliikenne luonnon ja ympäristön tuhoajana. In Santalahti, Päivi, V. Oroza, R. Laakia, M. Koivusalo & E. Hemminki (ed.): *Auto, terveys ja yhteiskunta*. Gaudeamus, Helsinki, 99-108

Klemola, Kimmo (2006): *Life-cycle energy consumption and carbon dioxide emissions of world cars*. Laboratory of Industrial Chemistry, Department of Chemical Engineering, Lappeenranta University of Technology, Finland http://www2.lut.fi/~kklemola/dontfly/carsof2006.htm

Klemola, Kimmo (2007): *Autoilun päästöt ja ohjauskeinot*. WWF Suomi http://www.wwf.fi/ymparisto/ilmastonmuutos/vaittamia_ilmastopolitiikasta/ilmastovastauksia/autoilun_paastot_ohjauskeinot.html

Koplow, Doug, Earth Track & Cutler J. Cleveland (2007): Ten most distortionary energy subsidies. In Cleveland, Cutler J (ed.): *Encyclopedia of Earth*. Environmental Information Coalition, National Council for Science and the Environment, Washington, D.C. http://www.eoearth.org/article/Ten_most_distortionary_energy_subsidies

Korten, David C (1995): *When corporations rule the world*. Earthscan, London

Krüger-Charlé, Michael (1989): Weichenstellung für eine AutoMobile Gesellschaft - Das Beispiel des Volkswagens bis 1945. In Die Grünen im Bundestag (ed.): *Welche Freiheit brauchen wir? Zur Psychologie der AutoMobilen Gesellschaft*. Elefanten, Berlin, 20-32

Kurz, Robert (1999): *Schwarzbuch Kapitalismus: ein Abgesang auf die Marktwirtschaft*. Eichborn, Frankfurt am Main

Kvaløy, Sigmund (1976): *Økokrise, Natur og menneske, Økofilosofisk fragment*. Tapir, Trondheim

Kvaløy, Sigmund (1992): Complexity and time - Breaking the pyramid's reign. In Reed, Peter & D. Rothenberg (ed.): *Wisdom and the Open Air, The Norwegian Roots of Deep Ecology*. University of Minnesota Press, Minnesota

La Boétie, Étienne de (1975): *The Politics of Obedience, The Discourse of Voluntary Servitude*. Black Rose, St. Urbain

Lapintie, Pyry (2007): Itämereen tulee paljon uusia arvaamattomia lajeja. *Helsingin Sanomat* 15.11.07 *p.* A10.

Lappé, Frances Moore & Joseph Collins (1988): *World Hunger: 12 Myths*. Earthscan, Lontoo

Lau, Thomas (2007): *ESF-COST conference examines food's journey from outside of the EU*. innovations-report http://www.innovations-report.de/html/berichte/umwelt_naturschutz/bericht-99727.html

Leiss, William (1978): *The Limits to Satisfaction, On Needs and Commodities*. Marion Boyars, London

Lelieveld, J., S. Lechtenböhmer, S. S. Assonov, C. A. M. Brenninkmeijer, C. Dienst, M. Fischedick et al. (2005): Low methane leakage from gas pipelines. *Nature*, no. 7035*/434*, 841-842

Levine, Bruce E. (2007): Mass society and mass depression. *The Ecologist*, no. October*/2007*, 48-51

Linebaugh, Peter & Marcus Rediker (2000): *The Many-Headed Hydra; Sailors, Slaves, Commoners, and the Hidden History of the Revolutionary Atlantic*. Beacon Press, Boston

Lohmann, Larry (2005): Marketing and Making Carbon Dumps: Commodification, Calculation and Counterfactuals in Climate Change Mitigation. *Science as Culture*, no. 3*/14*, 203-235

Lovins, Amory B. & L. Hunter Lovins (1982): *Brittle Power, Energy Strategy for National Security*. Brick House, Andover, Massachusetts

Lucas, Caroline (2001): *Stopping the great food swap, Relocalising Europe's food supply*. The Greens / European Free Alliance, European Parliament, Brussels http://www.greenparty.org.uk/files/reports/2004/1Stopping%20the%20great%20food%20swap.html

Lummis, C. Douglas (1996): *Radical democracy*. Cornell University Press, Ithaca

Luscombe, Stephen (2007): *Railways, Workhorses of Empire*. The Britsh Empire http://www.britishempire.co.uk/science/transport/railways.htm

MacLean, Heather L. & Lester B. Lave (1998): A Life-Cycle Model of an Automobile. *Environmental Science and Technology*, no. 13*/32*, 322A - 330A

Madeley, John (1999): *Big business, poor peoples: the impact of transnational corporations in the world's poor*. Zed Books, New York

Mallaby, Sebastian (2002): The Reluctant Imperialist: Terrorism, Failed States, and the Case for American Empire. *Foreign Affairs*, no. March/April, 2*/81*, 2

Martin-Jones, David (2006): No literal connection: images of mass commodification, US militarism, and the oil industry, in The Big Lebowski. In Böhm, Steffen, C. Jones, C. Land & M. Paterson (ed.): *Against Automobility*. Blackwell/Sociological Review, Oxford

Marx, Karl (2005[1867]): *Capital, Volume One, The Process of Production of Capital*. Marx/Engels Internet Archive http://marxists.org/archive/marx/works/cw/volume35/index.htm

Matthews, Emily, Christof Amann, Stefan Bringezu, Marina Fischer-Kowalski, Walter Hüttler, René Kleijn et al. (2000): *The Weight of Nations, Material Outflows from Industrial Economies*. World Resources Institute, Washington, D.C.

Mayer, Leo, Fred Schmid & Conrad Schuhler (2007): *G8: Agenda des kollektiven Imperialismus*. isw-Report *69-70*, Institut für sozial-ökologische Wirtschaftsforschung, München

McCracken, Grant (1988): *Culture and Consumption, New Approaches to the Symbolic Character of Consumer Goods and Activities*. Indiana University Press, Bloomington

Michaels, Dan (2002): The Gulag: Communism's Penal Colonies Revisited. *The Journal for Historical Review*, no. 1*/21*, 39 http://www.ihr.org/jhr/v21/v21n1p39_michaels.html

Mies, Maria & Veronika Bennholdt-Thomsen (1999): *The subsistence perspective, Beyond the globalized economy*. Zed, London

Mihevc, John (1995): *The market tells them so: the World Bank and economic fundamentalism in Africa*. Zed Books; Third World Network, London; Atlantic Highlands N.J.; Penang Malaysia

Millen, Joyce V & Timothy H Holtz (2000): Dying for Growth, Part I: Transnational corporations and the health of the poor. In Kim, Jim Yong, J. V. Millen, A. Irwin & J. Gershman (ed.): *Dying for Growth: Global Inequality and the Health of the Poor*. Common Courage Press, Monroe, Maine, 177-223

Ministry of the Environment (2007): *Sulphur Dioxide*. Government of Ontario http://www.airqualityontario.com/science/pollutants/sulphur.cfm

Mitchell, C.G. B. (1991): The importance and adverse effects of freight transport. In ECMT (ed.): *Freight Transport and the Environment*. European Conference of Ministers of

Transport, Paris, 15-38

Mumford, Lewis (1938): *The Culture of Cities*. Harcourt, Brace and Company, New York

Mumford, Lewis (1966): *The City in History, Its Origins, Its Transformations, and Its Prospects*. Secker & Warburg, London

Muradian, Roldan & Joan Martinez-Alier (2001): *Globalization and Poverty: An Ecological Perspective*. World Summit Papers of the Heinrich Böll Foundation *7*, Heinrich Böll Foundation, Berlin

Mäkelä, Kari, Anu Tuominen & Hanna Kalenoja (2002): *Unit Emissions of Vehicles in Finland*. Technical Research Centre of Finland , VTT http://lipasto.vtt.fi/yksikkopaastot/indexe.htm

Norberg-Hodge, Helena & Steven Gorelick (2002): *Bringing the Food Economy Home*. International Society for Ecology & Culture, Dartington, Devon http://www.isec.org.uk/articles/bringing.html

Nordstrom, Gunni (2004): *The Invisible Disease: The Dangers of Environmental Illnesses Caused by Electromagnetic Fields and Chemical Emissions*. O Books, Winchester

O'Meara Sheehan, Molly (2001): Making Better Transportation Choises. In Starke, Linda (ed.): *State of the World 2001, A Worldwatch Institute Report on Progress Toward a Sustainable Society*. W.W. Norton & Company, New York & London, 103-122

O'Rourke, Dara & Sarah Connolly (2003): Just Oil? The Distribution of Environmental and Social Impacts of Oil Production and Consumption. *Annual Review of Environment and Resources*, no. November*/28*, 587–617

OECD (1988): *Transport and the Environment*. Organization for Economic. Cooperation and Development, Paris

OECD (1997): *The Environmental Effects of Freight*. Organization for Economic. Cooperation and Development, Paris http://www.oecd.org/dataoecd/14/3/2386636.pdf

Opetushallitus (2007): *Liikenteen ympäristövaikutukset*. Luovuutta liikenteeseen http://www.edu.fi/teemat/keke/

Pajari, Katriina (2007): Uhkaavat kampamaneetit ovat valloittaneet koko Suomenlahden. *Helsingin Sanomat*, 15.12.07

Parenti, Michael (1995): *Against Empire*. City Lights Publishers, San Francisco

Paterson, Graham (2007): Alan Greenspan claims Iraq war was really for oil. *The Sunday Times*, 16.9.07 http://www.timesonline.co.uk/tol/news/world/article2461214.ece

Peden, Margie, Richard Scurfield, David Sleet, Dinesh Mohan, Adnan A. Hyder, Eva Jarawan et al. (ed.) (2004): *World report on road traffic injury prevention*. World

Health Organization, Geneva.

Perlin, John (1989): *A forest journey, The role of wood in the development of civilization*. Norton, New York

Pflüger, Tobias & Jürgen Wagner (ed.) (2006): *Welt-Macht EUropa, Auf dem Weg in weltweite Kriege*. VSA, Hamburg.

Pheisinger, Gerhard & Stefan Schennach (ed.) (1989): *Kolonialwaren, Die Schaffung der ungleichen Welt*. Lamuv, Göttingen.

Pimentel, David, Tad Patzek, Florian Siegert, Mario Giampietro & Helmut Haberl (2007): *Concerns over notes on biofuels in IPCC AR4 Mitigation report and SPM*. Letter to Dr Rajendra Pachauri, Chairman, IPCC http://www.grain.org/agrofuels/IPCC-Letter-to-DrRKPachauri.pdf

PIPA (2006): *Seven in Ten Americans Favor Congressional Candidates Who Will Pursue a Major Change in Foreign Policy*. Program on International Policy Attitudes http://www.worldpublicopinion.org/pipa/articles/home_page/262.php?nid=&id=&pnt=262&lb=hmpg1

Plouchart, Georgia (2005): Energy Consumption in the transport Sector. In : *Panorama 2005 international seminar*. IFP, Paris http://www.ifp.fr/IFP/en/files/cinfo/IFP-Panorama05_09-ConsommationVA.pdf

Plowright, Matthew (2006): *The most dangerous jobs*. UK MSN, Money http://money.uk.msn.com/insurance/life-insurance-guide/article.aspx?cp-documentid=4761054

Pomeranz, Kenneth (2000): *The Great Divergence: China, Europe, and the Making of the Modern World Economy*. Princeton University Press, Princeton

Rajan, Sudhir Chella (2006): Automobility and the liberal disposition. In Böhm, Steffen, C. Jones, C. Land & M. Paterson (ed.): *Against Automobility*. Blackwell/Sociological Review, Oxford

Robinson, William I. (2004): *A Theory of Global Capitalism, Production, Class, and State in a Transnational World*. Johns Hopkins University Press, Baltimore

Rotary International (2008): *Rotary International*. Evanston, USA http://www.rotary.org/en/AboutUs/RotaryInternational/Pages/ridefault.aspx

Roth, Karl Heinz (1987): Der Weg zum guten Stern des "Dritten Reichs": Schlaglichter auf die Geschichte der Daimler-Benz AG und ihrer Vorläufer (1890-1945). In Hamburger Stiftung für Sozialgeschichte des 20. Jahrhunderts (ed.): *Das Daimler-Benz-Buch, ein Rüstungskonzern im "Tausendjährigen Reich"*. Franz Greno, Nördlingen, 28-39

Rubin, Isaak Ilich (1972): *Essays on Marx's theory of value*. Black & Red, Detroit, Mich

Ruostetsaari, Ilkka (1992): *Vallan ytimessä, Tutkimus suomalaisesta valtaeliitistä*.

Gaudeamus, Helsinki

Røpke, Inge (1994): Trade, development and sustainability: a critical assessment of the "free trade dogma". *Ecological Economics*, no. 1*/9*, 13–22

Sachs, Wolfgang (1984): *Die Liebe zum Automobil, Ein Rückblick in die Geschichte unserer Wünsche*. Rowohlt, Reinbek bei Hamburg

Sachs, Wolfgang (1989): Die Auto-Mobil Gesellschaft, Vom Aufstieg und Niedergang einer Utopie. In Büggemeier, Franz-Josef & Thomas Rommelspacher (ed.): *Besiegte Natur, Geschichte der Umwelt im 19. und 20. Jahrhundert*. C.H. Beck, München, 106-123

Salmi, Hannu (1991): Autokulttuuri ja vauhdin maailma. In Santalahti, Päivi, V. Oroza, R. Laakia, M. Koivusalo & E. Hemminki (ed.): *Auto, terveys ja yhteiskunta*. Gaudeamus, Helsinki, 21-30

Schau, Erwin Meissner (2003): *Environmental Performance of Transport Systems, Master Thesis*. Norwegian University of Science and Technology, Faculty of Social Science and Technology Management, Trondheim

Schreyer, Christoph, Christian Schneider, Markus Maibach, Werner Rothengatter, Claus Doll & David Schmedding (2004): *External Costs of Transport, Update Study, Final Report*. IWW, Universität Karlsruhe & INFRAS, Zürich

Schuldt, Udo (2005): *Soziale und ökologische Auswirkungen des zunehmendenVerkehrs im Zeitalter der Globalisierung*. Vortrag anlässlich des attac-Themen Plenums vom 28.04.05 http://attac-hamburg-ag-oekologie-und-globalisierung.de/Praesentationen/Themenplenum.pdf

Schütz, Helmut, Stephen Moll & Stefan Bringezu (2004): *Globalisation and the Shifting Environmental Burden*. Wuppertal Papers *134e*, Wuppertal Institute for Climate, Environment and Energy, Wuppertal

Sea and Water (2007): *Environmental Performance of Shortsea Shipping*. Research Paper http://www.seaandwater.org/downloads/environmentalperformanceofsss.doc

Seppälä, Tomi, Teemu Haukioja & Jari Kaivo-oja (2001): The EKC Hypothesis Does Not Hold for Direct Material Flows: Environmental Kuznets Curve Hypothesis Tests for Direct Material Flows in Five Industrial Countries. *Population & Environment*, no. 2*/23*, 217-238

Sharma, Sohan & Surinder Kumar (2003): The military backbone of globalisation. *Race & Class*, no. 3*/44*, 23-39

Shoup, Laurence H. & William Minter (2004[1977]): *Imperial Brain Trust: The Council On Foreign Relations And United States Foreign Policy*. iUniverse, Lincoln, NE

Simms, Andrew (2005): *Ecological Debt: The Health of the Planet and the Wealth of*

Nations. Pluto, London

Sither, Tenzin Metok (2005): *Bombadier Transportation: Helping to Destroy Tibet*. Corporate Watch, Oxford http://www.corporatewatch.org.uk/?lid=2007

Sklair, Leslie (2002): *Globalization, Capitalism & Its Alternative*. Oxford University Press, Oxford

Smith, Adam (1937[1776]): *An Inquiry into the Nature and Causes of the Wealth of Nations*. The Modern Library, New York

Smith, David & Michael Tiberlake (1998): Cities and the Spatial Articulation of the World Economy through Air Travel. In Ciccantell, Paul S. & S. G. Bunker (ed.): *Space and Transport in the World-System*. Greenwood Press, Westport, Connecticut, 213--240

Smith, Jeffrey M (2003): *Seeds of Deception, Exposing Industry and Government Lies About Safety of the Genetically Engineered Foods You're Eating*. Yes! Books, Fairfield, Iowa

Solnit, David (ed.) (2004): *Globalize Liberation, How to uproot the system and build a better world*. City Lights Books, San Francisco.

Solomon, S., D. Qin, M. Manning, R.B. Alley, T. Berntsen, N.L. Bindoff et al. (2007): Technical Summary. In Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K. Averyt, M. Tignor & H. Miller (ed.): *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge University Press, Cambridge

Somersalo, Inna, Päivi Mattila, Hanna Tuomisto & Henri Haimi (2006): *Härkäpapua sarvista, Herkullista kasvisruokaa läheltä*. Multikustannus, Helsinki

Stammler, Florian (2000): Where does our oil come from?. In Tammilehto, Olli, P. Brusin-Niemi, S. Junttila, A. Lehmuskallio, U. Lehtinen, H. Myrttinen, J. Nissinen, M. Noland, M. Peltola & J. Sarjas (ed.): *Indigenous Peoples and Oil, Report of a seminar in Finland*. The Fourth World - First Peoples Finland, Turku, 6-7 http://www.maanystavat.fi/oil/oil_eng.html

Steinberg, Philip E. (1998): Transportation Space: A Fourth Spatial Category for World-Systems Perspective. In Ciccantell, Paul S. & S. G. Bunker (ed.): *Space and Transport in the World-System*. Greenwood Press, Westport, Connecticut, 19--33

Steingraber, Sandra (2001): *Having Faith, An Ecologist's Journey to Motherhood*. Berkeley Books, New York

Stretton, Hugh (2000): *Economics, A new introduction*. Pluto Press, London

Stuart, Paul (2002): *Camp Bondsteel and America's plans to control Caspian oil*. World Socialist Web Site http://www.wsws.org/articles/2002/apr2002/oil-a29.shtml

Stuber, Nicola, Piers Forster, Gaby Radel & Keith Shine (2005): The importance of the diurnal and annual cycle of air traffic for contrail radiative forcing. *Nature*, no. 7095*/441*, 864-867

Surface Transportation Policy Project (2007): *Transportation and Biodiversity*. Washington, DC www.transact.org/library/factsheets/biodiversity.asp

Szyliowicz, Joseph S. (2004): International transportation security. *The Review of Policy Research*, no. 3*/21*, 351–368

Tammilehto, Olli (1994): EU:n näkymätön yhtiökumppani. *Suomen Kuvalehti*, 21.10.94 http://www.tammilehto.info/eunnakymaton.htm

Tammilehto, Olli (1998): *Maailman tilan kootut selitykset*. Like, Helsinki ("The Collected Explanations for The State of The World", summary and extracts from the book in http://www.tammilehto.info/engalku.htm)

Tammilehto, Olli (1999): *The Effects of the Production and Consumption Patterns of Industrialized Countries on the Environment in the South*. Ympäristö ja kehitys - Coalition for Environment and Development, Turku http://www.tammilehto.info/north_south_environment.htm

Tammilehto, Olli (2003a): Vuosituhattavoitteiden taika: tilastot kaunistuvat, ihmiset kurjistuvat. *Kehitys*, no. 2*/2003*, http://www.tammilehto.info/millenium.htm

Tammilehto, Olli (2003b): *Globalisation and Dimensions of Poverty*. Ministry of Foreign Affairs, Department for International Development Cooperation, Helsinki http://www.tammilehto.info/tammilehto_globalisation.pdf

Tammilehto, Olli (2005a): Kapitalismista demokratiaan. In Hakkarainen, Outi, J. Airaksinen & T. Selin (ed.): *Talous ja demokratia, Ratkaisuja Suomesta ja muualta*. Like, Helsinki, 17-28 http://tammilehto.info/kapdem.htm

Tammilehto, Olli (2005b): *Is it Shameful to Be a Revolutionary? Major intentional social changes as a rational political perspective*. http://tammilehto.info/majorchange.htm

Tammilehto, Olli (2005c): *Revolution without Taking Power, John Holloway on a major social change*. http://www.tammilehto.info/revwithout.htm

Tammilehto, Olli (2007): G8 – vaaraton herrasmiesklubi?. *Elonkehä*, no. 6*/2007*, http://www.tammilehto.info/g8_vaaraton.htm

Tammilehto, Olli, Anne Brax, Henrik Hausen & Heidi Hautala (ed.) (1989): *Kun edustajat eivät riitä, Kansalaistoiminnan opas*. WSOY, Porvoo. http://www.tammilehto.info/ktopas/

Tamminen, Erja, Päivi Rekula & Matti Juusela (2003): *Sähköä ilmassa, Tietoa ympäristömme sähkömagneettisen säteilyn vaikutuksista ja suojautumisesta*. Erja Tamminen Ay, Järvenpää

Tamminen, Terry (2006): *Lives per Gallon, The True Cost of Our Oil Addiction*. Island Press, Washington, DC

Tatem, Andrew J., Simon I. Hay & David J. Rogers (2006): Global traffic and disease vector dispersal. *Proceedings of the National Academy of Sciences of the United States of America*, no. 16*/103*, 6242-7 http://www.pnas.org/cgi/reprint/103/16/6242

Teufel, Dieter, Petra Bauer, Rainer Lippold, Sabine Braunfeld & Kurt Schmitt (1999): *Öko-Bilanzen von Fahrzeugen*. UPI-Bericht *25*, Umwelt- und Prognose- Institut e.V., Heidelberg

THE PEP (2004): *Transport-related Health Effects with a Particular Focus on Children, Towards an Integrated Assessment of their Costs and Benefits,State of the Art Knowledge, Methodological Aspects and Policy Directions, Executive Summary*. UNECE – WHO Transport, Health and Environment Pan-European Programme

Thomas, Pat (2007): Changing climate, changing health. *The Ecologist*, no. October*/2007*, 16-17

UN (2007): *UN Millennium Development Goals*. United Nations http://www.un.org/millenniumgoals/index.html

UNCTAD (2002): *The least developed countries report 2002*. United Nations Conference on Trade and Development. Geneva http://www.unctad.org/en/docs/ldc02.en.pdf

UNCTAD (2007): *Handbook of Statistics On-line*. United Nations Conference on Trade and Development http://www.unctad.org/Templates/Page.asp?intItemID=1890

Uusitalo, Paavo (1991): Auton yhteiskunta. In Santalahti, Päivi, V. Oroza, R. Laakia, M. Koivusalo & E. Hemminki (ed.): *Auto, terveys ja yhteiskunta*. Gaudeamus, Helsinki, 178-204

Wallerstein, Immanuel (1983): *Historical Capitalism*. Verso, London

WBCSD (2002): *Mobility 2001: World Mobility at the End of the Twentieth Century, and its Sustainability*. World Business Council for Sustainable Development, Conches-Geneva http://www.wbcsd.ch

WBCSD (2004): *Mobility 2030: Meeting the challenges to sustainability*. World Business Council for Sustainable Development, Conches-Geneva http://www.wbcsd.ch

Weatherford, Jack (1988): *Indian Givers, How the Indians of the Americas trasformed the world*. Ballantine Books, New York

Veen-Groot, Daniëlle B. van & Peter Nijkamp (1999): Globalisation, transport and environment: new perspectives for ecological economics. *Ecological Economics*, no. 3*/31*, 331-346 www.sciencedirect.com

Vella, Yuri (2000): Kogalym-Lor - the lake where a man died. In Tammilehto, Olli, P. Brusin-Niemi, S. Junttila, A. Lehmuskallio, U. Lehtinen, H. Myrttinen, J. Nissinen, M.

Noland, M. Peltola & J. Sarjas (ed.): *Indigenous Peoples and Oil, Report of a seminar in Finland*. The Fourth World - First Peoples Finland, Turku, 12-14 http://www.maanystavat.fi/oil/oil_eng.html

Verhagen, Marcus (2003): Picture Plane. *Contemporary*, 50 www.comtemporary-magazin.com

Vidal, John (2008): True scale of $C0_2$emissions from shipping revealed, Leaked UN report says pollution three times higher than previously thought. *The Guardian*, 13.2.2008 http://www.guardian.co.uk/environment/2008/feb/13/climatechange.pollution

Wolf, Winfried (1996): *Car Mania, A Critical History of Transport*. Pluto Press, London

Wolf, Winfried (2007): *Verkehr.Umwelt.Klima, Die Globalisierung des Tempowahns*. Promedia, Wien

World Bank Group (2006): *World Development Indicators 2006*. http://devdata.worldbank.org/wdi2006/contents/Front.htm

World Carfree Network (2007): *Some Statistics*. Prague http://www.worldcarfree.net/resources/stats.php

World Chambers Network (2008): *World Chambers Network*. Paris http://www.worldchambers.com/default.asp

YLE (2007): *Lentoliikenne tulee mukaan EU:n päästökauppaan vuonna 2012*. Suomen Yleisradio, Helsinki, 20.12.07 http://www.yle.fi/uutiset/24h/id78135.html

Zachcial, Manfred & Christel Heideloff (ed.) (2005): *Shipping Statistics Yearbook 2005*. Istitute of Shipping Economics and Logistic (ISL), Bremen.