Global resources and the need for sustainable technologies

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Natural resources, exploitation and the new questions of sustainability

- Introduction: On globalisation development and sustainability
- 1. Climatic zones, biomes, and the damages of vegetation and soil.
- 2. Biomes: Forests and grasslands as a resource
- 3. Fresh water and marine resources
- 4. Oil, charcoal and the endless needs for renewal energy
- 5. Mineral resources and their exploitation

- 6. Conflicts based on natural resources: Congo, Iraq etc.
- 7. How to solve the energy crises?
- 8. New nations and new concepts of development
- 9. Development by next generations: Information/
- sustainable technologies
- 10. Are there any possibilities for "green globalisation"?
- Attempts to fair globalisation?
- (Ritva Kivikkokangas-Sandgren, Autumn 2006)



Figure 1.2 Development as economic growth and development as enhancing freedoms.



David Smith's depiction of the question 'Are we all in the same boat?' Based on Smith (2000).

On the concept of globalisation and sustainability ?

- When taking about the world resource base we must similarly talk about resources from the viewpoint of the endless competition for all raw material, energy and the division of other world resources. The growing inbalance between consumption and production of world resources was first culminated by the oil crises in the 1970s. In 2006 oil is the biggest dictator in the foreign policy of the nations. Is there still any sustainability in today's world?
- "Globalisation refers to the process of intensification of economic, political, social and cultural relations across international boundaries" (Akindele et al 2002).
- "Globalisation constitutes the dominant international systam that replaced the Cold War system after the fall of the Berlin Wall" (Friedman).
- New concepts come from the "Trade on human terms" and "Aid for trade" by UNDP, to promote infrastructure, education and health care (democracy and human rights, linked to trade).

Previous and ongoing forces of globalisation

 Expansive world trade, the colonization of developing countries and their decolonization. Neo-liberal market economy: transnationals, multinationals and the free trade economic zones and trade unions. The production of goods by cheap labour force, big markets of consumers and the change in the North-South -relations of development. NIE-countries: China, India, Brazil, South-Korea, Taiwan, Malesia etc.

NIE-countries of 7-9 % economic growth

- New challenges of endless needs for energy and other natural resources
- China
- India
- Brazil
- 90 percentage of the future generations live in developing countries.



China's New Heights

competing for resources ... t's growing. CHINA U.S. 8%

Oil consumption and production Millions of barrels a day

Consumption

Retail sales In billions 9

and bursting with consumers

Car \$600 ownership 500 In millions 100

Globalisation effects on world regions

- **Urbanization**: The new cities of ten million people in the South and the shanty towns.
- **Structural adjustment** of economies, conflicts, regional inbalance and poverty. **Africa** is left out of globalisation?
- **Competition** for the need of **natural resources**, **energy** and **space** (the growth of China's GNP is 10 % per year). High regional development, political conflicts, rural poverty.
- HIV/AIDS -struggle
- **Development**: IT-technology, UN's targets to decrease poverty, new partners of economic globalisation (NIE)
- Cultural and environmental changes, institutional and governance change, glocal responses to globalisation.

The importance of resources in the development process

- Human social development depends on the physical resource base of the globally closed system in which matter and energy cannot be created or destroyed.
- There has been much debate between prospective development achievements and environmental resources at all scales of analysis:
- 1) Cause of development and/or underdevelopment (Wallerstein 1975, 1984, Frank 1969, Huntington 1945),
- 2) "Mankind on the brink of extincton" (Ehrlich 1968),
- 3) Colonialism and neocolonialism and the cause of inter-regional conflicts and wars (Kongo, Nigeria).

The World Summit on Sustainable Development, Johannesburg, 2002

- "Earth Summit" in Rio de Janeiro, 1992 constituted the fundamental challenge of global sustainability: The complex interdependencies of environmental, economic and social development.
- Overcoming poverty is in the center for effective **strategies** for sustainable development.
- Processes of globalisation bring risks as climate change and opportunities for all people (new renewal technologies) and for the **environment**.



bout the conons of modern i's father left his h Hunan province the southern s that power the export-led When Li was 13, er came to the where he boardwatchman, apnot believing shabby migrant a student's lidn't let him in. ny ways, Li es the Chinese poor country boy ard, becomes the from his school college and in the big city. concerned about no didn't make it: million rural ins-including his ents-who have bitant taxes and g agricultural nd flooded the search of work. igrants are what ghosts in the

profiles see n

of," he says, "but they are barely treated as human beings." Li decided to write about their plight, and his accounts of the rural poor resonate with Chinese readers, This year he was nominated for the country's top literary award for debut authors. But China's publishers, wary of offending the censors, haven't been as encouraging. The first edition of Li's 2004 coming-of-age out, but there has not

novel, Red X, quickly sold been a second printing. Li, 23, has refused the publisher's request to edit out what it called "morally offensive" passages. Li can't vet support his parents so that they can guit their factory jobs. "Maybe this year I can make enough money for them to retire," says Li. Then two ghosts will leave the city, but there will always be millions more to take their place. -By Hannah Beech/ Guandzhou

WHO LISTENS

With its forest of neonemblazoned high-rises, Shanghai's Xuhui district embodies the country's dazzling economic development. But Xuhui is profiting from an even rarer commodity: political reform. Led by district tants can participate in town-hall-style meetings to discuss a wide range of concerns, such as an innovative parole program and the location of a new garbage dump. "Before, leaders just made decisions," Sun says. "Now we have public hearings to allow ordinary people to debate things." That idea may sound suspiciously like democracy. But Sun, a smooth-

apaon addit and mo proud declaration that he has personally answered 10,000 e-mails from the public since taking office last year. The change is remarkable. Five years ago, many government offices didn't even have a phone number that citizens could call. There is no guarantee that leaders like Sun will one day rule China. But Sun is already making history. -By Hannah Beech/Shanghai



NATION. The world's largest retailer isn't just buying—and selling—stuff in China. It has become a major force for change

90



The wealth so evident in cities like Shanghai remains out of reach for most of the population. China must cope with the stress

TWO WORLDS: A worker



Future of energy consumption



Figure 6.5 Energy intensity versus time in industrialised and developing countries. From Edge and Tovey (1995).

The phenomenon of climatic zones is on the radiation of the solar energy

• We know that it is the globe which circulates around the sun at the ellipse form. The radiation amount of the sun varifies to the surface of the globe in between the ITC, Tropics of Cancer (27'N, summer) and Capricorn (27'S, winter). All life is dependent on the solar energy. Solar radiation is also the source of the planetary wind system and underwater currents of oceans. The high and low pressure differences of the atmosphere cause the NEand SE-trade winds, Westerly wind and Easterly wind zones from the permanent low and high pressure zones of the globe: Humid tropics of permanent low pressure (0' Equator) dry subtropics of permanent high pressure (30' N and S) and wet polar of permanent low pressure /60'N and S). It is the coriolis power which turns all winds to the right (in N) or left (in S), the more the further from the Equator. Asian monsoons are regional and annual.

The challence of renewal natural resources

- Land and water resources: Agriculture (soil types, cultivation of cereals and other vegetation), forestry, fishery.
- Endless competition of the non-renewal resources has made energy resources politically sensitive. The future of biofuel and other renewal natural resources will due to the big change of energy politics in the West (USA, Sweden, Finland in 15-30 years?). This will be the big challenge of technology and consuming habits.

Climatic regions of the Earth









Makeavesivarat



Makeavesivarat asukasta kohti





Vesipula

Renewal water resources



16 kuukautta 1970veden pintalämpötin aina 40 °N leveys-

itokset liittyvät pääsäännöllisesti esiin-28). On myös todetnäärillä ja Yhdysvalttuvien hurrikaanien iteys. Länsi-Sahelin Atlantilla oli vuositähemmän kuin kui-

yös siksi, että kuiva iteilyn pois, jolloin ittävästi. Tällöin ei nyöskään voi syntyä uivuus myös vähenblyn määrää, jolloin ninen sekä maasta kuiva maa-alue voi iteetonta ilmakehän . Näin kuivuudesta ehä. Siten ilmeisesti vuosina 1975–76 ja pin siellä oli poikke-



63A Sademääräindeksi Länsi-Afrikassa ja Sahelissa



induced inducation var laan interval innakenan virtauste

aavikot ja aavikoitumisriskit



Bioms of the Earth



Maapallon biomit.



Regions under increasing risks





Pohiois-Amerikan itäosien ja Euroopan met-

pyydetaan merista. Parnaimmat Kalastusalueet





- 68A Merikalastusta Atlantilla
- 68B Suurimmat kalastusvaltiot v. 1996
- 68C Tärkeimmät kalastusalueet ja niiden pyyntikalat



Non-renewal natural resources

- Energy sources: Oil, gas and coal
- Minerals (in use 80/2000): Development of industry and technology. Fe most important. Al is the third common (as bauksite in rocks; needs much electricity to be made as Al).
- Stategic minerals: industry, IT (mobile phones, computers etc.) and war technology: Cu,Pb,Hg,Tin,Cr,Co,Mn,Mol,Ni,Van,Vol.
- Conflicts on tantalone and uranium.

nergiantuotanto



Oil countries and main recipients



osta on sus jatkuvasti supistunut.

matta kivinnen käyttö nsaantynee

nen taulukko osoittaa öljyn t

ivihiilen tärkeimmät tuottajamaat vuonna 1991.





autaa on yli puolet. Tärkeimpiä tuottajia Kiina, Brasilia, Australia, Venäjä sekä Uka (86A). Venäjän parhaat alueet ovat Uralil-Yhdysvalloissa Yläjärven länsipuolella.

autaa erotetaan malmista ja terästä valmisan kivihiilen avulla pelkistämällä. Hiiltä uu rauta- ja terästeollisuudessa valtavasti.

Alumiini, kupari, tina ja sinkki

Alumiini on maankuoren yleisin metalli. Alumiinimalmia sanotaan *bauksiitiksi*. Sitä muodostuu trooppisessa ilmastossa latosolimaannoksesta. Australia tuottaa kolmanneksen maailman bauksiitista (87A).

Bauksiitin kaivaminen on halpaa, mutta mal-

Aluminium (8%) the third general element, made of bauksite in rocks

Table 6.2 The importance of mineral production in the economies of developing nations. Percentage of total merchandise exports via fuels, ores and metals for selected countries, 1999

Country	Percentage of merchandise exports via fuels, ores and metals	Country	Percentage of merchandise exports via fuels, ores and metals
Algeria	96	Nigeria	99
Armenia	22	Norway	57
Australia	36	Oman	78
Azerbaijan	70	Papua New Guinea	35
Bolivia	29	Peru	45
Chile	43	Russian Federation	52
China	42	Saudi Arabia	86
Colombia	40	Senegal	27
Ecuador	33	South Africa	31
Guinea	71	Syria	69
Indonesia	28	Togo	27
Jordan	27	Trinidad and Tobago	27
Kazakhstan	64	Tunisia	54
Kuwait	79	UAE	No data provided
Libya	95	Venezuela	85
Niger	67	Yemen	93





kövoimaa. Alumiini erotetaan malmista yleensä kaukana kaivosalueista maissa, joissa on halpaa energiaa kuten Norjassa ja Kanadassa. Alumiinia tarvitaan teollisuudessa teräksen jälkeen eniten. Sitä käytetään mm. lentokoneiden ja autojen valmistuksessa, koska se on kevyttä ja ruostumatonta. Siitä valmistetaan paljon myös virvoitusjuomatölkkejä.

Kuparin, sinkin, lyijyn ja tinan merkitys on

hyvin myös elektroniikkateollisuuden käyttöön. Se ei myöskään hapetu. Suuri osa käytetään mm. korujen valmistukseen ja hampaiden teko- ja korjausaineeksi.

Kulta esiintyy luonnossa puhtaana. Suomessa kultaa on huuhdottu jo sata vuotta Ivalojoen ja Lemmenjoen laaksoissa. Huuhdottava kulta on soran hienoimmassa osassa pieninä irrallisina hippuina. Suomesta on löydetty useita lupaavia kallioperän kultaesiintymiä, mutta kultaa louhitaan vain Oriveden kaivoksesta.

Suurin kullantuottaja on Etelä-Afrikka, jossa kultaa louhitaan kalliosta jopa neljä kilometriä syvissä kaivoksissa. Kapeissa, kosteissa ja kuumissa käytävissä Öljynvienti Kiinaan kasvanut nopeasti. Sinopec kehittää Yadavaran öljykenttää 70 miljardin dollarin hankkeessa. Maakaasutuotanto polkaistu vauhtiin Kiinan investoinneilla.

Saudi-Arabia

Kiinan suurin öljyntoimittaja. Sinopec sijoittaa 300 miljoonaa dollaria maakaasuvarojen kehittämiseen.

Nigeria

nkkeita.

ETELÄ-

ministeriö,

t Book

MERIKKA

AFRIKKA

Kiina rahoittaa uusia rautateitä.

Angola

Kiina ostaa jo kolmanneksen öljyntuotannosta ja antaa miljardilainoja vastineeksi uusista etsintäoikeuksista.

Irak

Sinopec sopi rakentavansa öljyvaraston Basraan.

LÄHLITÄ

Suurin öljyalan investoija on Kiina. China National Petroleumilla on laajimmat oikeudet levottoman Darfurin öljykentille.

Sudan

Kiina jatkaa yrityksiä saada öljyputki, joka toisi 700 miljoona tonnia raakaöljyä 25 vuoden aikana.

KIINA

KAAKKOIS AASIA

Pakistan

Kazakstan

China Nation Petroleum o PetroKazakh öljyfirman. N putki Kiinaan tuu loppuvu

Myanmar

Kiina tukee s taa, joka on tiedustelutul lähellä Malal salmea.

Thaimaa

Kiina harkits tusta kanaali olisi vaihtoel Malakan sali

Indonesia

Kiina sopi us energia-alan ta ja sotilaall yhteistyöstä assa, joka or Malakan sali valvoja.

Öljynvienti Kiinaa kasvoi

Oman

Kiinaan kasvoi 76 prosenttia viime vuonna.

KESKI-AASIA

Kiina rahoitti Gawadariin syvävesisataman, joka tarjoaa uuden kuljetusreitin ja tarkkailupaikan Lähi-idän liikenteeseen.

Conflicts on natural resources





TERRA 113: 1 2001

9



Information technologies and innovators

 Human Development Index (HDI) is linked to the new Technological Achievement Index (TAI). The more educated people, old and new innovations and technological poles the country had achieved in the past, the more human capital and technical possibilities it would have to make a good advantage of Information Technology and other global development in the future.