

## Global Challenges Survey

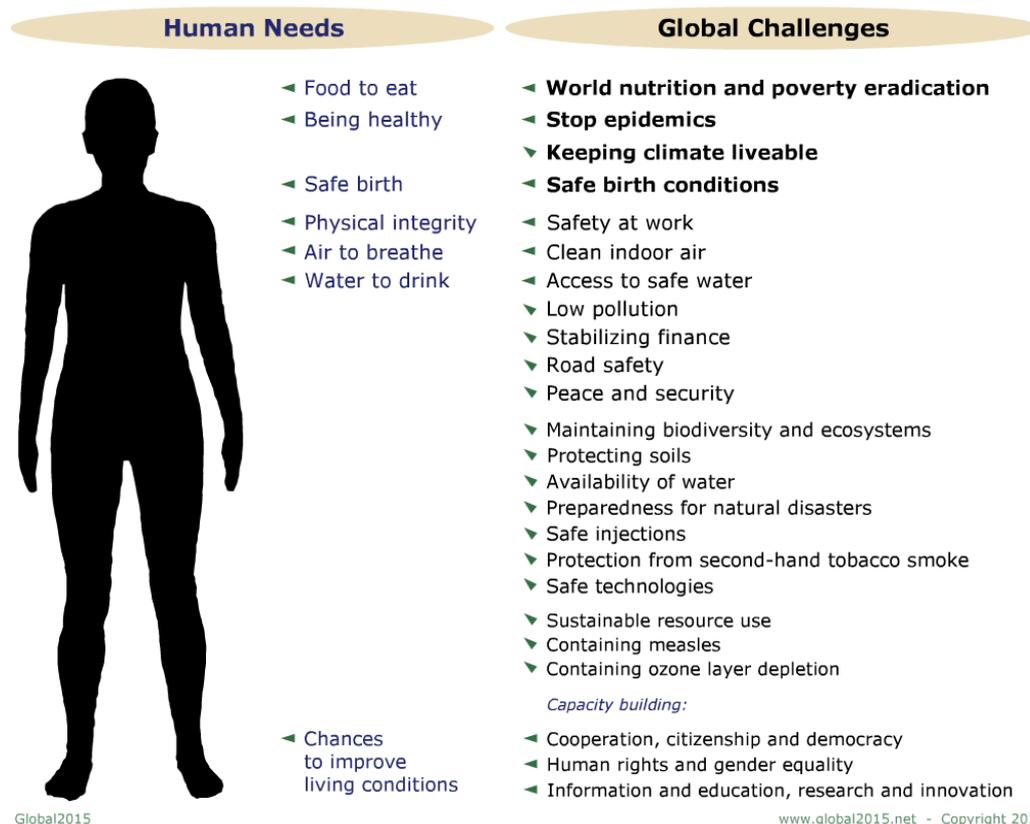
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### Introduction

This survey gives an overview of the most urgent global challenges to human needs and life. All these challenges are of vital importance for human life, since they deal with overcoming or reducing large-scale damage that has already been

caused and/or reducing risks that affect many people. The challenges addressed originate mainly from man-made causes – less as a result of individual actions but rather due to larger-scale human activities.

### Global Challenges for Human Needs and Life



The global challenges have been weighed and prioritized as far as available data and risk as-

sessments allow. They are considered with regard to the questions: Are they being given enough at-

tention? Are efforts being made to overcome them? For selecting and weighing the challenges, indicators are used which relate to: damages and risks to life and health, economic and social development, and the natural resources on which human life depends. Data, risk assessments, goals, targets and recommended measures are all taken from trusted sources such as scientific institutions, UN organizations, national administrations, and unaffiliated foundations. Due to data quality and availability issues, the order of challenges described below should not be seen as a strict hierarchy. In particular, some challenges characterized primarily by risks may be underestimated due to lack of available data.

It should be noted that this survey does not attempt to give a complete description of all global challenges or the state of the world. Instead it identifies only the most urgent. This does not

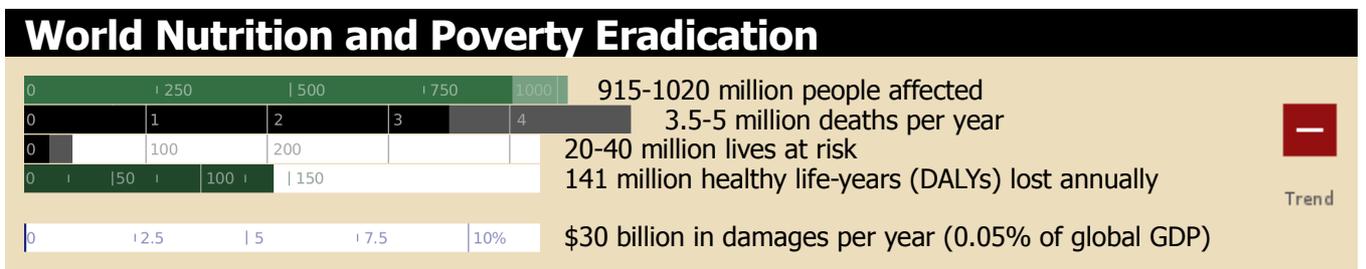
mean that challenges not addressed here are irrelevant or negligible. Furthermore, this survey seeks a global perspective, rather than limiting it to particular countries or groups of countries.

Within this survey the various connections and overlapping of the global challenges are only indicated rather than explored fully. They are described more precisely in the separate pages on each specific global challenge. This information is available on the Global2015 website in the previous version of the survey, which is currently in the process of being updated.

Although many of these challenges seem too daunting for people to become involved in, progress has already been made; and some other severe problems have already been solved. All progress towards saving human lives, improving health and protecting other basic requirements for our existence is worth the effort.

*Annotations, methodology, sources and contact data at the end of the document*

## Global Challenges



Although there is enough food to feed every person on the planet, the number of people suffering from chronic hunger has risen to between 915 million and 1.02 billion. As a result, approximately

3.5 to 5 million people die per year. The death toll of the worst famine in human history claimed 20 to 40 million lives. 141 million healthy life-years (DALYs, disability-adjusted life-years) are lost

each year as a result of premature deaths and disability. Medical expenditure as a result of malnutrition costs roughly 30 billion dollars per year. One of the main causes is extreme poverty, which has increased to now include 1.4 billion people living below the extreme poverty line of \$1.25 per day. The financial crisis will leave an additional 64 million people in extreme poverty by the end of 2010. The members of the United Nations have agreed upon targets to halve the proportions of undernourished and extremely poor people, from 1990 to 2015. In order to reach the target to halve undernutrition, \$30 billion is needed each

year. Recommended measures include: school meal programmes, food for work projects, providing access to productive resources such as land, water, seeds, knowledge, and microcredit, as well as policies that counter the negative effects of higher food prices.

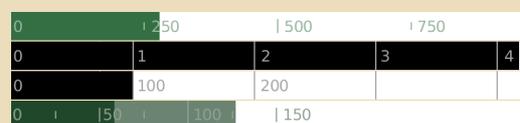
(Sources: FAO 2009, p. 10; FAO 2009, 11; Black et al. 2008, 243, 254, UNICEF 2008, WFP 2004, 4, and The Hunger Project; CBC 2008; Black et al. 2008, 254; FAO 2004, 11; WB 2008, 30, and 2008a; WB 2010, 6, 101, and UN 2010, 7; UN 2000, § 19.1; FAO 2008, 6; WB 2008b, i.)

### DALYs: Disability-adjusted life years

One DALY represents the loss of one year of equivalent full health. DALYs are the sum of

- the years of life lost due to premature mortality (YLL) in the population and
- the years lost due to disability (YLD) for incident cases of the health condition. (WHO 2004, 95.)

## Stop Epidemics



287 million people affected  
4.2 million deaths per year  
over 100 million lives at risk  
58.5-127 million healthy life-years (DALYs) lost annually  
over \$24 billion in damages per year (0.04% of global GDP)



Trend

The number of people suffering from HIV/AIDS has risen to about 33.4 million. Around 11.1 million people are ill from tuberculosis (TB), and 243 million from malaria. Together, these diseases kill around 4.2 million people per year, showing a decrease. These three diseases together account for an annual loss of 58.5-127 million healthy life-years (DALYs). There are also global risks from drug resistant diseases and new diseases, with a potential to cause severe damage to humankind – though the probability of its occurrence remains uncertain. At present, an event similar to the 1918 Spanish flu pandemic could result in over 100 million deaths and economic losses of about 3.1% of world gross product. Annually, HIV/AIDS

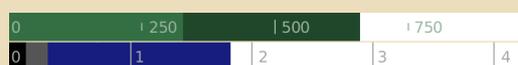
causes losses of 2-4% of GDP in many affected countries, TB \$12 billion in the poorest countries, and malaria \$12 billion in Africa. The UN targets a halt in the spread of HIV/AIDS, malaria, and other major infectious diseases, by 2015. Providing public information and anti-retroviral therapy against HIV/AIDS requires at least \$25 billion in 2010. Further measures consist of safe practices in injections and blood transfusions, anti-malaria bed nets, insecticide use, improved case detection and the introduction of new treatments.

(UNAIDS/WHO 2009, 6; WHO 2009a, 1, 4-5; WHO 2009b, 27; UNAIDS/WHO 2009, 6, WHO 2009a, 1, and 2009b, 27 [sum – self calculation]; WHO 2008a, 60; WBGU 1998, 62; MA 2005, 89,

and Taubenberger/Morens 2005; Brahmhatt [WB] 2006, 10, and WB 2006; UN 2004a, 85, 89; Global Fund 2010; One 2010; UN 2000, § 19.4;

UNAIDS 2007, 185; Hauri et al. [WHO] 2004, 1803, WHO 2009b, viii, and 2009a, 1.)

## Keeping Climate Liveable



325 million people affected, 660 million in the future  
141-315 000 deaths per year, 182 mn within the century



5.4 million healthy life-years (DALYs) lost annually  
per year \$126 billion to 5-23% of global GDP in damages



Trend

Man-made climate change is likely to include weather extremes and global warming of 1.1-6.4°C by 2100 – harming agriculture, biodiversity, freshwater resources, coastal zones, human health, and many other areas. Climate change already affects around 325 million people, and is likely to increase up to 660 million affected by 2030. Around 141 000 to 315 000 annual deaths are attributed to climate change, potentially amounting to a total of 182 million deaths by the end of this century. Currently, around 5.4 million healthy life-years (DALYs) are lost annually due to premature deaths and disability resulting from climate change. The cost of diseases and disasters related to climate change is estimated to be \$126 billion per year, and including long-term damages the figure rises to approximately \$1.35 trillion per year (2% of gross world product). The losses could rise in the future to 5-23% of per-capita consumption. Linear climate change is a risk with quite a high extent of potential damage and quite a high probability of occurrence; non-

linear changes have a higher extent of damage but an unknown probability. There are 40 industrialized countries and countries in transition that have agreed to reduce their greenhouse gas emissions by 5% from 1990 levels, by 2012. Although they have achieved this on average, global emissions have still increased by 24.4%. Efforts to mitigate and adapt to climate change should be intensified, such as: strengthening energy efficiency, energy saving technologies and practices, renewable energy sources, emissions trading or a carbon/energy tax, additional tax on air travel, forest preservation and afforestation, environmentally sound agricultural practices, technology transfer, protection of coastal zones, and public health care.

(IPCC 2007, 7-8; GHF 2009, 9; GHF 2009, 12; WHO 2009, 50, and GHF 2009, 11; Christian Aid 2006, 9; WHO 2009, 52; GHF 2009, 92; Stern 2006, 143, Kempfert/Schumacher [DIW] 2005, 35, and OECD 2008, 281; WBGU 1998, 62; UNFCCC 2008, part 2; IPCC 2007, 4; UNEP 2009, 44.)

## Safe Birth Conditions



300 million people affected  
3.5-4.5 million deaths per year



126-165 mn healthy life-years (DALYs) lost annually



Trend

3.5 to 4.5 million infant and maternal deaths occur each year and 34% of deliveries take place

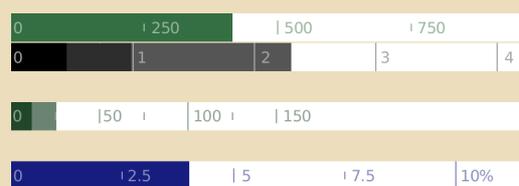
without the assistance of skilled attendants (a decrease from previous years). The losses in econo-

mic development due to the financial crisis are projected to result in the deaths of an additional 265 000 infants, between 2009 and 2015. At present, 300 million women suffer from illnesses brought about by pregnancy or childbirth in unsafe conditions. About 126-165 million healthy life-years (DALYs) are lost annually. The UN members have set targets to reduce the mortality rate of children under the age of 5 by two thirds and the maternal mortality rate by three quarters from 1990 levels, by 2015. Furthermore, the UN has agreed to strive for universal access to reproductive health and family planning. Comprehen-

sive measures to reduce child mortality would require about \$52.4 billion per year. Measures include providing more visits from a trained health-care practitioner during the course of pregnancy, skilled birth attendance, emergency obstetric care, postnatal care, and access to family planning.

(WHO 2008a, 54, UNICEF 2009, 2, IHME 2010, 7, 11, and WHO 2008, 9; UN 2010a, indicator 5.2; WB 2010, 6-7; WHO 2005, 10; WHO 2008a, 60; UN 2000, § 19.3; UN 2006a, 6; WHO 2005, xvii, and Stenberg et al. 2007; UN 2010, 34.)

## Safety at Work



428 million people affected  
0.457-2.3 million deaths per year

11.6-25.6 million healthy life-years (DALYs) lost annually

4% of global GDP lost per year



Trend

There are about 268 million occupational accidents and 160 million victims of work-related illnesses each year. The number of people who die from work-related diseases or accidents has risen to between 457 000 and 987 000, or even 2.3 million annually. The burden of disease amounts to 11.6-25.6 million lost healthy life-years annually (DALYs). Resulting economic costs amount to roughly 4% of gross world product (global GDP/GNP). There is no international target, but there are international labour standards on occupational safety agreed upon by the ILO (International Labour Organisation). Occupational cancers are

entirely preventable through hygiene measures, substitution of safer materials, enclosure of processes, and ventilation. Traditional prevention and control measures should be applied to hazardous chemicals, machinery and tools, manual handling, and biological agents. However these need to be complemented with strategies and tools designed to deal with risks arising from new technologies.

(ILO 2005, 3, 7, 1, and 2009, 1; WHO 2009, 50 [sum – self calculation], and ILO 2009, 1; WHO 2009, 52 [sum – self calculation]; ILO 2009, 1, and 2003, 14; ILO 2010; WHO 2002, 75; ILO 2010, 13.)

## Clean Indoor Air



3.1 billion people *endangered* (47% of world population)  
1.97 million deaths per year



41 million healthy life-years (DALYs) lost annually



Trend

An increasing number, currently around 1.97 million people (mainly women and children), die each year from respiratory diseases resulting from indoor air pollution. This is mainly due to cooking inside with an open fire and could be seen predominantly as a result of lack of access to modern energy sources. The number of people who live in such households has increased to about 3.1 billion. This results in the loss of 41.0 million healthy life-years (DALYs) annually. The WHO air quality guideline for respirable particulate matter with a diameter less than 10 micro-

metres (PM<sub>10</sub>) applies also to indoor air pollution. Investing \$13 billion per year would halve the number of people worldwide cooking with solid fuels by 2015. Measures include providing households with clean fuels or improved stoves, the installation of a hood or chimney, and home insulation for more efficient heating.

(WHO 2009, 50; WHO 2002, 69; IEA 2008, 177, ITDG 2003, WHO 2006a, ix, and 2007; WHO 2006, 10; WHO 2009, 52; WHO 2006a, 9; WHO 2009c.)

## Access To Safe Water



2.65 billion people *endangered* (40% of world population)  
1.91 million deaths per year



64.2 million healthy life-years (DALYs) lost annually



Trend

About 884 million people do not have access to hygienic water (though this is decreasing in the long-term) and 2.6 billion are missing basic water sanitation (increase from previous figures). This is the main cause of around 4.6 billion cases of disease, and it is resulting in about 1.91 million deaths annually, mostly children. It also leads to the loss of about 64.2 million healthy life-years (DALYs) annually. Due to the financial crisis, it is projected that an additional 100 million people will lack access to clean water by 2015. The UN members agreed to halve – from 1990 to 2015 – the proportion of people lacking access to safe drinking water, as well as the proportion of those

having no access to basic sanitation. To achieve these targets, \$11.3 billion per year is needed. However, this investment has the potential to gain \$84 billion in annual benefits. Measures range from hygiene education and disinfection at the point of consumption, up to providing basic sanitation facilities, collecting rainwater, providing public taps and/or connecting households to piped water.

(WHO/UNICEF 2010, 7; WHO/UNICEF 2010, 6; WHO 2008, 28; WHO 2009, 50, 23; WHO 2009, 52; WB 2010, 103; UN 2000, § 19 [1], and 2002, § 24, 7; Hutton/Haller [WHO] 2004; Prüss-Üstün et al. [WHO] 2008, 17-18, and WHO 2009, 23.)

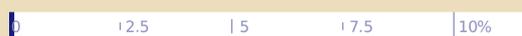
## Low Pollution



1.84 billion people *endangered* (30% of world population)  
1.15 million deaths per year, 3.1 million in the future



9.6 million life-years (YLL) lost annually



\$74.3 billion in damages (0.12% of global GDP)



Trend

About 1.84 billion of the global urban population are exposed to levels of particulate air pollutants above the international health related guideline for PM<sub>10</sub> (particulate matter less than 10 micrometres in diameter). 1.15 million people die each year as a result of urban air pollution. In 2030, 3.1 million people may die because of airborne particles. Currently, around 9.60 million life-years are lost annually due to premature deaths (YLL). The cost of the damage caused by air pollution in the USA is about \$74.3 billion. The risks from persistent organic pollutants and hormonally active substances are uncertain, but they remain the environment for a long time. The UN members

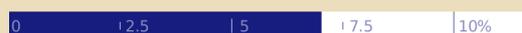
aim to minimize the adverse effects of chemicals by 2020 and support the safe management of chemicals in the Global South. Suggested measures include: filtering or reduction of emissions from vehicles, power plants, and industry; switching to renewable energy; traffic reduction, expansion of public transport and bicycle usage; safer chemicals and safeguarding against toxic substances.

(OECD 2008, 183ff., and 2008a, Data, world, above 20 µg/m<sup>3</sup> [sum – self calculation]; WHO 2009, 50; OECD 2008, 257; OECD 2008, 260; WBGU 1998, 66; WHO 2006, 9; UN 2002, § 23; OECD 2008, 260-261, 382ff.)

## Stabilizing Finance



76-208 million people affected  
1.465 million deaths over 7 years (2009-2015)



7% of global GDP in damages



Trend

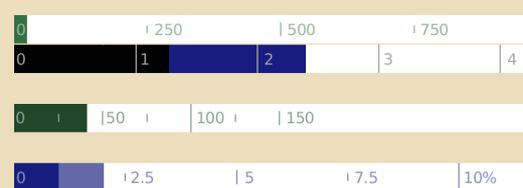
Since 1970, financial crises have increased and have resulted in fiscal costs over the 1980s and 1990s of more than \$1 trillion. Over 2007-2009, the worst financial crisis since 1929 occurred. To prevent a breakdown in the global economy, governments intervened with guarantees, loans and capital shares of some \$20 trillion. Fiscal stimuli of around \$2.6 trillion were spent. Nonetheless, after the financial crisis the world's economic output is still 7% lower, relative to a no-crisis scenario. The crisis will leave an additional 64 million people in extreme poverty by the end of 2010. The losses in economic development due to the

crisis are projected to result in the deaths of an additional 265 000 infants and 1.2 million children under the age of 5, between 2009 and 2015. There was an estimated increase of almost 34 million unemployed since 2007, and in 2009 alone, an additional 41.6 to 109.5 million workers were in vulnerable employment as a result of the financial crisis. The potential scale of market risk in derivatives transactions has amounted to \$21.6 trillion in outstanding gross market values. Countries of the Global South are \$2.7 trillion in debt to industrialized countries. The debt service paid by less developed countries has almost halved to

3.5% of their exports of goods and services. Efforts to reduce risks include a far-sighted regulation of financial markets (regarding transparency, equity, risk management etc.), better international cooperation and curbing global account imbalances. The UN has been striving for debt relief packages, which have cumulated to \$82 billion in 2010.

(Laeven/Valencia [IMF] 2008, 7, 56, and WB 2006a; UN 2010b, 16; UN 2010b, 19; UN 2010b, 4; UN 2010, 7; WB 2010, 6-7; ILO 2010a, 9; ILO 2010a, 18; BIS 2010, 10; WB 2007, 187; UN 2010a, indicator 8.12; G-20 2008, 2009, 2009a, 2010, FSF 2008, IIF 2008, UN 2006, viii, IMF 2008a, UNDP 2007, 293, and EK 2002, 115-116; UN 2000, § 15.2; UN 2010a, indicator 8.11.)

## Road Safety



24.3 million people affected  
1.27 million deaths per year, in the future 2.4 million

41.2 million healthy life-years (DALYs) lost annually

1-2% of global GDP in damages



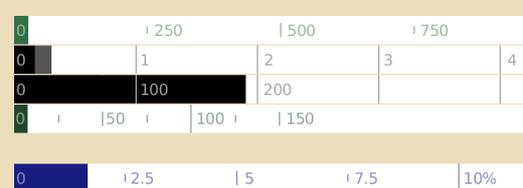
Trend

About 24.3 million people are injured or disabled, and 1.27 million people die in road traffic accidents each year. A resultant loss of 41.2 million healthy life-years (DALYs) occurs annually. The global economic costs of road crashes have been estimated at 1-2% of gross world product. Sufficient and safe transport capacity is required to tackle this and other global challenges. The annual number of deaths resulting from road traffic accidents are projected to double to 2.4 million by 2030. There is no international target, but a global ministerial conference suggested a target

to stabilize and then reduce the forecasted level of global road deaths by 2020. 75 countries have already set targets. Measures to improve road safety include: safe road and vehicle design, traffic management, seat belts, helmets, day-time running lights, speed limits, restrictions on drinking and driving, and improved post-crash care.

(WHO 2008a, 28, 58, 117; WHO 2009e, 11, 1-3; WHO 2008a, 64; WHO 2004a, 15-16, 2009e, 2, and TRL 2000; WHO 2008a, 58, 23; WHO 2009g; WHO 2009e, 35, and 2004c, 8.)

## Peace and Security



27.1 million people affected  
172-310 000 deaths per year  
191 million lives lost in a century  
7.38 million healthy life-years (DALYs) lost annually

\$1 trillion, or 1.6% of global GDP in damages per year



Trend

Between 172 000 and 310 000 people are killed per year by violence in recent armed conflicts, although the number is decreasing. Within the 20th century, there were about 191 million deaths as a result of armed conflicts. About 27.1 million people are displaced within their own country

because of armed conflict, situations of general violence or violations of human rights. About 7.38 million healthy life-years (DALYs) are lost annually because of wars and armed conflicts. Economic damages due to armed conflicts are estimated to be \$1 trillion per year. With the advent of wea-

apons of mass destruction, the danger of man-made devastation of mankind exists. Production and storage of NBC (nuclear, biological and chemical) weapons as well as nuclear weapon early-warning systems, pose similar risks as those presented by nuclear energy facilities and large chemical facilities, but with varying probability of occurrence. The UN has demanded the disarmament of weapons of mass destruction and some treaties stipulate a ban on chemical and biological weapons, as well as the proliferation of nuclear weapons. However, the implementation of these

restrictions poses a considerable problem. Measures include: the prevention of armed conflicts through support of non-violent conflict resolutions; limiting the effects and the occurrence of armed conflicts by public international law; arms control and disarmament. Activities to reach a world free of nuclear weapons have been strengthened considerably.

(WHO 2008a, 58, 2004, 124, and 2002, 80, UCDP 2006; WHO 2002a, 21; IDMC; WHO 2008a, 64; WBGU 1998, 73-73; UN 2004; UN 2009 and NPT 2010.)

## Maintaining Biodiversity and Ecosystems



31% of species abundance lost  
\$462 billion to \$1.5 trillion lost per year (0.76-2.5% of GDP)

Trend

Only two of the fourteen indicators for biodiversity, which is essential for the ecosystem's stability, have shown a positive trend in recent years. The Living Planet Index points out a 31% decline of species abundance since 1970. Invasive species cause economic losses of \$336 billion to \$1.4 trillion per year. Ecosystems are also overstressed by deforestation and over-fishing. The net loss of forests has decreased in recent decades to 5.2 million hectares annually. However, each year, illegal logging causes losses in assets, revenue and royalties of more than \$15 billion. Deforestation affects the climate and could thereby lead to global economic costs of \$60 billion per year. More than 75% of fish stocks are fully or over-exploited and are therefore underperforming due to inefficiency, at an estimated annual loss of \$51 billion. The global risks from ecosystem destabilization and anthropogenic affects on mass developments of species have a

high potential for damage, with high resp. unknown probabilities of occurrence. The UN members missed their target to significantly reduce the rate of loss of biodiversity by 2010 and are striving to reverse the loss of forest cover worldwide. Measures include: establishing more protected areas and improving existing ones; using more environmentally sound methods in agriculture; storing seeds and genes; protecting species threatened by extinction; supervising and restricting trade of illegally harvested timber; setting standards for intensity of logging and fishing; addressing consumption patterns; providing appropriate pricing and incentives; payments for ecosystem services; eco-certification; and creating opportunities for rural enterprises, farmers and local communities based on the maintenance of biodiversity and ecosystems.

(CBD 2010, 22; CBD 2010, 24; Pimentel et al. 2001, 14, CBD 2010, 6; UN 2010, 53; WB 2006b,

1-2; Eliasch 2009, 30 [net present value per year]; WB 2009, 41; WBGU 1998, 62; CBD 2002, § 11, and 2010, 9; UN 2002, § 42, and 2006a, 6;

UNFF 2006, 3; CBD 2010, 84-85, OECD 2008, 206, and TEEB 2010.)

## Protecting Soils



1 billion people *endangered* (16% of world population)



12-29% of global land area affected



Trend

Soils enable the production of more than nine tenths of all food. About 1 billion people and 12 to 29% of the global land area, are already affected by soil degradation. Moreover, large areas of arable land are at risk of being turned into steppe or deserts. Major causes are overgrazing, intensive or inappropriate methods of agriculture, and deforestation. The large-scale extraction and transfers of nutrients and virtual water embedded in feed and animal products

may lead to serious lasting consequences for ecosystems and soil fertility. The UN has agreed on a goal to combat desertification and mitigate the effects of drought. The United Nations Convention to Combat Desertification (UNCCD) has initiated various action programmes on a regional and national level. Suitable plantings can improve the quality of soils.

(UNEP 2007, 93; UNEP 2007, 93; FAO 2009; FAO 2009a, 61; UNCCD 1994; unccd.int)

## Availability of Water



1.2 billion people *endangered* (19% of world population)



5-25% of global freshwater is in over-use



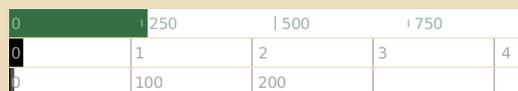
Trend

The number of people living in areas of physical water scarcity has risen to 1.2 billion. They lack sufficient water for food production, health, and development. Between 5% to 25% of global freshwater use likely exceeds long-term accessible supply and the global average water quality is declining, too. The frequency of water-related conflicts has increased. By 2025, it is estimated that 3.5 billion people will live in water scarce or water stressed areas. The UN members have agreed to stop the unsustainable exploitation of water resources by developing water management strategies. Such measures include better

allocation of water to different water user groups; integration of water supply and use with the management of waste; sewage and groundwater protection; reduction of leakage loss in storage, drainage and irrigation systems; rain water harvesting and recycling of waste water to increase agricultural water efficiency; and fostering cross-border co-operation in the management of shared water resources.

(IWMI 2007, 10, and FAO 2007, 135; MA 2005, 106-107, 43.; Pacific Institute 2009; WB 2007a, 2; UN 2000, § 23 [4]; UN Water/GWP 2007, WWC 2009 and UNESCO 2008.)

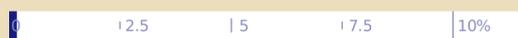
## Preparedness for Natural Disasters



269 million people affected  
115 000 deaths per year  
850 000 to 4 million lives at risk



Trend



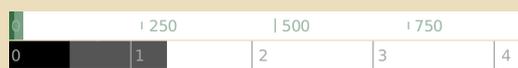
\$107 billion, or 0.18% of global GDP in damages per year

Annually, over the last ten years, roughly 269 million people (4.24% of the world's population) were affected by natural disasters, with an increased annual average of 115 000 people dying as a result. Exceptionally, the devastating earthquake in Haiti in 2010 killed over 223 000 people. The deadliest natural disaster in recorded history, the flood of the Huang He (Yellow river), resulted in 850 000 to 4 million casualties. Economic losses from natural catastrophes total around \$107 billion per year and have increased roughly five-fold since the 1970s. While there is no international target, the UN has started the International Strategy for Disaster Reduction, with the goal of reducing human, social, economic and environmental losses due to natural hazards and related

technological and environmental disasters. Measures consist of: building disaster resilient communities, enhancing awareness, implementing regulations on the earthquake-proof construction of buildings, limiting settlements in risk areas, providing natural floodwater storage and dams to limit floods, early warning systems, preparing and providing emergency relief and health care, and support for the subsequent reconstruction, if needed.

(Red Cross 2009, 168; Red Cross 2009, 167; Munich Re 2010; NOAA 1999, Encyclopædia Britannica 2008 and CBC 2008; Red Cross 2009, 169; Christian Aid 2006, 7; UN/ISDR 2000; UN/ISDR 2007, POST 2001, 2, and UN/ISDR 2008.)

## Safe Injections



10-26 million people affected  
417 000 to 1.3 million deaths per year



Trend



6.96 million healthy life-years to 26 million life-years lost



\$535 million, or 0.001% of global GDP in damages per year

Annually, between 417 000 and 1.3 million deaths are caused by unsafe injection practices in medical practices. About 6% of the world population each year receive injections contaminated with hepatitis B (hepatitis is a long-term cause of liver cirrhosis and liver cancer). Reuse of injection equipment without sterilization leads to 8 to 20.6 million cases of new hepatitis B infections, 2.0 to 4.7 million cases of hepatitis C infections and 80 000 to 260 000 cases of HIV infections annually. As a result, there is an estimated loss of

between 6.96 million healthy life-years (DALYs) and 26 million life-years (YLL) annually. Unsafe injection practices potentially cost more than \$535 million per year in direct medical expenditures. There is currently no international target, but the WHO member states agreed to promote total injection safety. Measures to achieve this include the communication of risks associated with unsafe injections to patients and health care workers, training of health care workers, ensuring access to sufficient quantities and quality of injec-

tion equipment in health care facilities, and management of sharps waste.

(WHO 2009, 50, 2008, 44, Hauri et al. [WHO] 2004, 1831, WHO 2002, 78, and Miller/Pisani

1999, 808-809; WHO 2009, 48; Hauri et al. [WHO] 2004, 1831, and Kane et al. 1999, 803; WHO 2009, 52; WHO 2008, 44, and Miller/Pisani 1999, 808-809; WHO 2010; Hauri et al. [WHO] 2004, 1840, 2002, 130-131, and SIGN 2010)

## Protection from Second-hand Tobacco Smoke



700 million people *endangered* (12% of world population)  
600 000 deaths per year



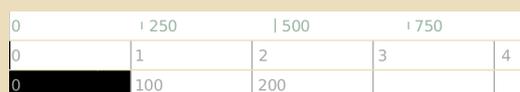
Trend

Globally, about one third of adults are regularly exposed to second-hand tobacco smoke. Approximately 700 million children (about 40% of the world's children) regularly breathe air polluted by tobacco smoke. Tobacco is one of the main risk factors for a number of chronic diseases: including cancer, lung diseases, and cardiovascular diseases. Second-hand smoke causes about 600 000 premature deaths per year. There is no global target, but the WHO air quality guideline

for particulate air pollutants can also be applied to the indoor environment. Measures include public education, providing smoke-free environments, and – as agreed by all WHO members – protecting people from exposure to tobacco smoke in indoor workplaces, public transport and public areas.

(WHO 2009f, 20; WHO 2009f, 20; WHO 2010a; WHO 2009f, 20; WHO 2006, 10; WHO 2007 and 2003, Art. 8)

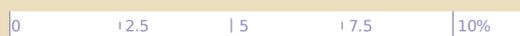
## Safe Technologies



184 000 people affected  
9 767 deaths per year  
over 100 million lives at risk



Trend



\$1.52 billion, or 0.02% of global GDP in damages per year

Annually, over the last ten years, disasters with a technological trigger affected 184 000 people and killed 9 767 people on average, at a cost of about \$1.52 billion each year. Safe technologies are, for example: renewable energies, recycling-based economy, and bionics. High risk technologies include: (1) nuclear power, large chemical facilities, and dams (potential for very extensive damage with a very low probability of occurrence), (2) certain genetic engineering applications (potential for very extensive damage but unknown

probability), and last but not least, (3) any climate damaging technology. The three most severe accidents caused by these high risk technologies resulted in about 32 500 to 442 500 deaths in total. Genetic engineering could lead to antibiotic resistant bacteria, or the creation of new or worse germs. A new epidemic similar to the 1918 Spanish flu could result nowadays in over 100 million deaths and severe economic disruption. Gene transfer by genetically modified crops could also affect population dynamics and biodiversity.

The potential effects on human health of the consumption of food produced through genetic modification must be carefully examined. The worldwide cost of decommissioning nuclear power stations is estimated at thousands of billions of dollars. Nanotechnologies need ongoing assessment. However, "new" renewable energy sources (small hydropower, modern biomass, wind, solar, geothermal, and biofuels) have grown to 6% of global final energy consumption, and 18% of world electricity generation. The UN has addressed the transfer of environmentally sound technologies, as well as technological risks from nuclear waste management and biotechnology. Measures consist of: support of research, development and

market launch of safe technologies; product labelling; and regulation and reduction of technological risks, including the option of prohibition or fade-out of unsafe technologies.

(Red Cross 2009, 168; Red Cross 2009, 167; Red Cross 2009, 169; WBGU 1998, 62; People's Daily Online 2005, Asia Times Online 2003, Chernobyl Forum 2006, 16, Greenpeace 2006, 10, 26, 48, and WBGU 1998, 71; Johnson 1999, 133, ISP 2003, Garcia/Altieri 2005, and Hooftman et al. 2008; MA 2005, 89, and Taubenberger/Morens 2005; WHO 2009d; McKeown 2003, 24; REN21 2010, 15; EIA 2010, 4; OECD 2008, 386; UN 1992, chap. 34, 22, and CBD 2000; WBGU 1998, 218, 220.)

### *Additional Serious Challenges*

## **Sustainable Resource Use**



\$4 trillion over 1-2 decades, or 0.3-0.6% of GDP p. a. at risk

Trend

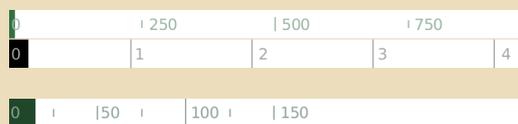
Global resource extraction has increased to about 55 billion tonnes per year (minerals, metal ores, fossil energy carriers and biomass). Maintaining or increasing this level of supply beyond the coming decades depends on continued success in exploration and extraction of deposits that are currently uneconomically viable or even undiscovered. There is significant potential for conflicts over natural resources to intensify in the coming decades, and energy use and pollution caused by resource extraction will likely rise. Projected onset of maximum oil extraction ranges from 2006 to 2030. Subsequent disruptions in oil supply could cost the US economy alone around \$4 trillion, triggering international crises and jeopardizing

food security in many less developed countries. There is no international target, but the United Nations Environment Programme (UNEP) suggested a long-term reduction of resource consumption by a factor of 10. Proposed approaches are substitution, savings, and resource efficiency: dematerialization, miniaturization, durability, reusing of products respectively components, and recycling of material.

(OECD 2008, 240; RWI/ISI/BGR 2006; UNEP 2009a, 30; IEA 2007, 5; ASPO 2008, 2010, EWG 2008, BGR 2005, IEA 2004, 2008, 6, Birol 2008, ITPOES 2010 and UKERC 2009, 150-151, 164-165; DOE 2005, 4, 31, 71; UNEP 1999, 2.)

## Challenges Nearly Contained

### Containing Measles



10 million people affected

164 000 deaths per year



14.9 million healthy life-years (DALYs) lost annually

Trend

From 2000 to 2008, vaccinations against measles reduced the number of deaths from 733 000 to 164 000 (78% decrease). About 83% of the world's children who live in high risk countries received one dose of measles vaccine by their first birthday, through routine health services, in 2008 – up from 72% in 2000. Measles affects about 10 million people, mostly children. This is much fewer than the 27.1 million people in 2004, who lost 14.9 million healthy life-years due to measles. WHO and UNICEF established a global target of reducing measles mortality by 90% of the level in 2000, by 2010. However, experts on global immunization warn of a resurgence in deaths due to measles if vaccination efforts are

not sustained. Projections show that without supplementary immunization activities in most affected countries, mortality will quickly rebound: amounting to a projected 1.7 million measles-related deaths in the period of time between 2010 and 2013. Measures consist of routine measles vaccination for children, combined with mass immunization campaigns in countries with high case and death rates; effective surveillance of measles outbreaks; and better treatment of measles.

(WHO/UNICEF 2010a, 2; WHO/UNICEF 2010a, 2; WHO/UNICEF 2010a, 2; CDC 2010; WHO 2008a, 28; WHO 2008a, 60; WHO/UNICEF 2005, 8, 26; UN 2010, 28; WHO/UNICEF 2010a, 12)

### Containing Ozone Layer Depletion



150 million people would have been affected in the future



Trend

Damage to the ozone layer by fluorinated hydrocarbons has already been considerably reduced by measures undertaken even before the damaging effects could be clearly proven. This is a success story for the application of the precautionary principle. In the Montreal Protocol of 1987, it was agreed to stop production and use of ozone depleting substances (CFCs and FCs) by 2010. This has been achieved to 98%. Without this, a tenfold increase in atmospheric levels of ozone-de-

pleting substances by 2050 resulting in exposure to the sun's ultraviolet radiation (UV) would likely have added up to 20 million cases of skin cancer and 130 million cases of eye cataracts. It would also have led to damage to human immune systems, agriculture and wildlife. Nevertheless, there are still risks from heightened UV radiation such as skin cancer and cataracts, until the expected recovery of the ozone layer sometime in the mid-21st century. Protective measures still

have to tackle problems with regard to some substitutes, CFCs produced and traded illegally, and the management of pre-existing stockpiles.

(UN 2005; Montreal Protocol; UN 2010, 55, and 2007, 25.)

### *Extending Capacities to tackle Global Challenges*

## **Capacity Building through Cooperation, Citizenship, and Democracy**



In order to overcome global challenges, the capacity of individuals and organizations needs to be reinforced. Building the capacity of communities and individuals can contribute to practical progress. Means to accomplish this include: (1) cooperation in partnerships by persons and/or institutions, enterprises or organizations; (2) civic commitments of people or the "corporate citizenship" of enterprises or institutions; (3) options for democratic participation in public affairs, including transparency and good governance. The Agenda 21 and the Millennium Declaration of the United Nations both rely on the principle of coope-

ration. Partnerships are on the rise, and the number of parliamentary democracies has increased along with the institutional, social and technical possibilities for participation. Good governance stayed constant, or even slightly improved; the perceived level of public-sector corruption has decreased; and the number of companies reporting on their own corporate social responsibility has increased.

(UN 1992, 2.1, 23; UN 2000, § 20; CSP 2009, 11, Economist 2008, 10, and Freedom House 2010, 1; Kaufmann et al. [WB] 2009, 37-38, 33-35, 3, 22-24; TI 2009; CorporateRegister.com 2010, 4.)

## **Capacity Building through Human Rights and Gender Equality**



Getting involved with improving conditions of life is made easier by rules and guarantees that are stipulated in universal, civic, political, economic, social, and cultural human rights. This kind of empowerment can strengthen activities, too. Gender equality, rooted in human rights, is a key to many global challenges. The UN members target to end disparities between boys and girls in all levels of education. There are currently 97 girls for every 100 boys enrolled in primary school, and 96 in secondary school, with an up-

wards trend. The share of women in parliaments has increased from 12.8% in 1990 to 19.0% in 2010. Nevertheless, this is far from an equal representation, and women are still facing many kinds of discrimination and violence. With regard to political and civic rights in general, the share of world population assessed to be participating in a high level of them has increased in the long-term. (UN 2000, § 19.2, 20.1, 24, 25; UN 2010a, indicators 3.1 and 3.3; UNIFEM; Freedom House 2010.)

## Capacity Building through Information and Education, Research and Innovation



Capacity building also includes access to information and education. This enables people in understanding problems and influencing politics and markets on the base of solid information, as well as choosing options concerning lifestyles. Furthermore, it assists in creating and accelerating new solutions in research and development and thereby shaping our paths to the future. Agenda 21 and the Millennium Declaration emphasize strengthening education and science along with the role of private business and information technology. The UN target for 2015 is that all children shall be able to complete primary schooling – in 2008, 89.6% of all children were enrolled in primary

school, and 88.1% of those who had started primary school completed their schooling (both increasing). Due to the financial crisis, 350 000 fewer students will complete primary school in 2015. Additionally, the UN has maintained that information and communication technologies shall be available to all. Today, in the Global North 68% have Internet access, whereas in the Global South it is only 15% (both increasing). Patent activity is rising, too.

(UN 1992, 30, 35, 36; UN 2000, 19.2, 20.5; UN 2010a, indicators 2.1 and 2.2; WB 2010, 103; UN 2010, 72; OECD/JPO/EPO 2008, 59-60, and WIPO 2010, 33)

## Annotations

For numeric names the short scale is used:

1 billion = one thousand million =  $10^9$  = 1 000 000 000

1 trillion = one thousand billion =  $10^{12}$  = 1 000 000 000 000

1  $\mu\text{m}$  = 1 micrometre (micron) = 0.001 mm =  $10^{-6}$  m

All figures in dollars relate to US dollars.

The base year of all target data is 1990, unless otherwise stated.

Trends specified by + or – refer to the current direction of development (improving or getting worse), but not to whether the development is on track to meet a given target.

All percentages of world population are taken from the referred source, or in substitution to that calcula-

ted from data provided in USCB 2010, according to the respective year.

Almost all available data on global conditions is of low precision. Most data on the largest problems facing mankind are only partially taken from actual measurements of specific cases, more often, estimates are based on modelling and extrapolation. So the data base is far from meeting the motto of the WHO Report 2005:

“Make every mother and every child count”.

## Methodology

In order to identify the most urgent global challenges, the Global 2015 survey uses the following criteria:

- The challenges are of existential importance for life and the needs of many people;
- The factors responsible for the problem are mainly anthropogenic (man-made), respectively there are options available for humans to avoid or minimize the impacts, or to improve the situation; and
- The impacts on people affected are not primarily caused by the affected individuals, nor can they be minimized solely by them, but rather require outside assistance or larger scale changes in human activities.

The challenges are differentiated according to the possible actions or means of addressing them. Weighting the challenges is done by combining data

on the extent and the severity of the challenges. This includes:

- number of affected, or endangered people;
- number of deaths;
- lost healthy life-years (DALYs);
- affected natural foundations of life (portion of global resources); and
- economic damages.

In order to keep this study transparent and verifiable, a simple method is used to combine data. To make the data comparable, each indicator is transformed into a percentage. Each value of a percentage indicator is calculated relative to the highest value of the same indicator, which is set to be 100%. Afterwards, the percentages are simply summed for each challenge. The global challenges are presented from the highest to lowest priority according to this combined indicator. The calculation process in detail:

Number of affected people as percentage of their highest value (if not available, number of endangered people as percentage of world population) (1)

+ number of current or future deaths as percentage of their highest value (2)

+ number of lives at risk as percentage of highest deaths value (same weight)

+ 0.5 x (number of lost healthy life-years [DALYs] as percentage of their highest value) (3)

+ affected natural foundations of life as real percentage data (4)

+ amount of current or future damages as percentage of their highest value (5)

= combined indicator

- (1) Being affected by one of the problems covered in the survey is considered to be more severe than only being endangered. According to the data given, the number of people affected is weighted about three times more heavily than data on people who are simply exposed to a problem.
- (2) If figures on current and future deaths are available, the average is used.
- (3) Because DALYs include premature death cases, which are already covered, the DALYs are weighted at half the value of reports on deaths.
- (4) Because there is insufficient data on the affected natural foundations for life, the relative importance of the available data was not recalculated to reach 100%. Therefore, where there is a lack of information on a problem, it was chosen to err on the side of under-representing it, rather than

over-representing it.

- (5) Data on future economic damages are given as net present values or percentage of gross world product, and are therefore comparable to data on current economic damages (which are already given as percentage of gross world product, or calculated into a percentage of current gross world product).

Despite all these considerations, it has to be strongly emphasized that due to lack of relevant and reliable data, the resulting order of challenges cannot be considered to be very precise. They are therefore better viewed as groups with high, middle and lower relative priority. Thus, rather than seeing a problem listed as number 5 as definitely more important than one listed in position 6, it is more appropriate to conclude that challenges listed in positions such as 5

and 6 will be more urgent than a challenge listed in position 10. Nevertheless, the real data shows very clear differences between the challenges indicating

higher or lower relevance. This is visualized by the small diagrams below each challenge title.

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## Global2015

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