

Introduction to Environmental Sciences

EES 102

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14-15/1/2025, L5

Class footprint- Jan 2025

Ecological footprint calculator

333 | 133
Turned in | Assigned

☐ Saving... ⓘ



Biocapacity- 1.6 gha

world citizen 2.7 gha

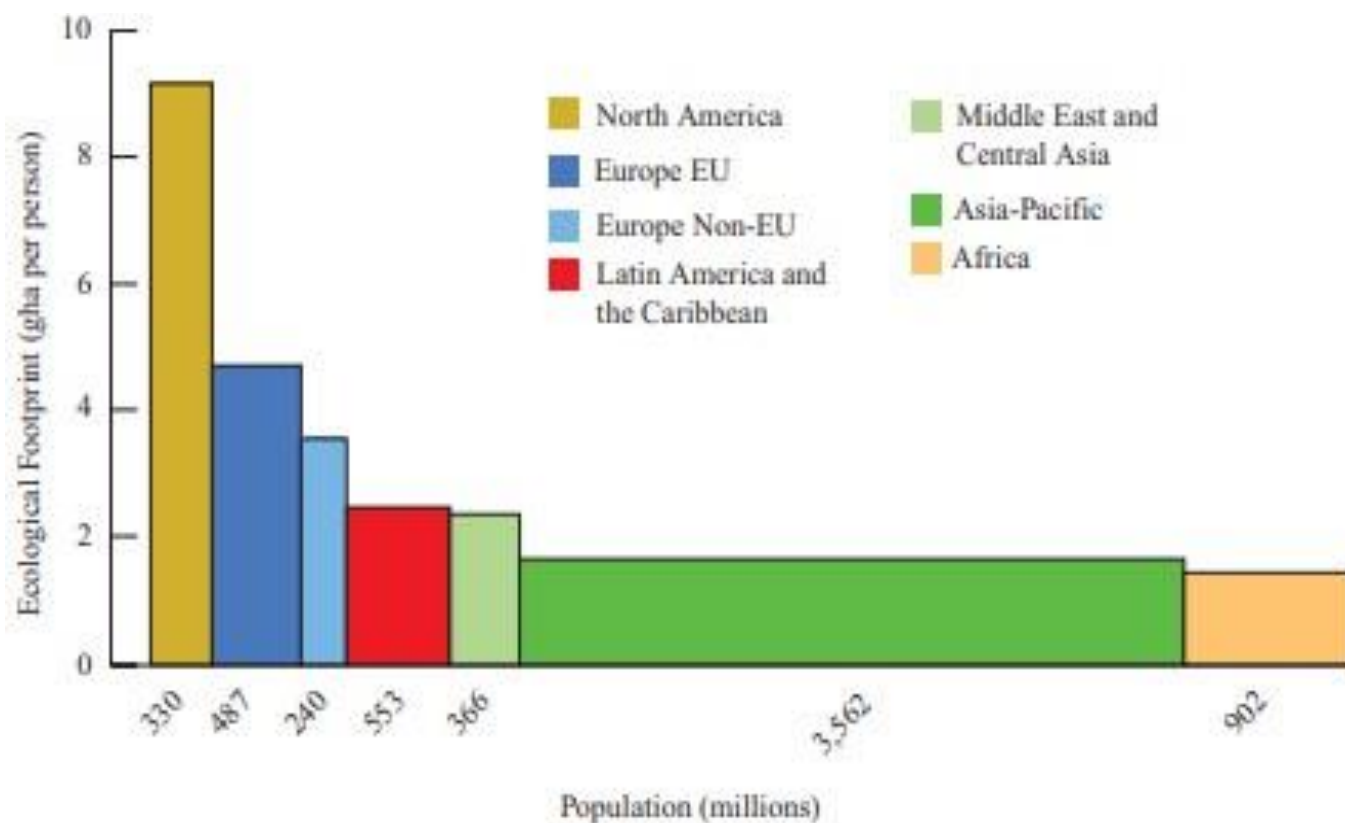


FIGURE 1 Ecological footprint by region, 2005. Bar weight shows footprint per person. Width of bars shows population size. Area of bars shows the region's total ecological footprint.

Source: WWF, 2008.

Sustainable Development (Brundtland Report 1987)

- It is defined as "meeting the needs of the present without compromising the ability of future generations to meet their own needs."
- Rio meeting (1992) in Brazil brought together many diverse group together (Environmentalists, politicians, workers, wealthy and poor countries) and the idea of sustainable development was spread through this meeting.

Table 1.1 Quality-of-Life Indicators

	Least-Developed Countries	Most-Developed Countries
GDP/Person ¹	\$2,122	\$41,395
Life Expectancy	63 years	81 years
Adult Literacy	58%	99%
Child Labor ²	21.7	~0
Female Secondary Education	17%	95%
Total Fertility ³	4.1	1.8
Infant Mortality ⁴	55	5
Percent Urban	29.8%	81.9%
Electricity Access	34.2%	99.9%
CO ₂ /Capita ⁵	0.3 tons	11 tons

¹Annual gross domestic product per person, U.S. dollar equivalent

²Percent ages 5–14

³Average births/woman

⁴Per 1,000 live births

⁵Metric tons/yr/person

Source: UNDP Human Development Index, 2018.

- The World Bank estimates that 700 million people (nearly 10 percent of us) live below an international poverty line of (U.S.) \$1.90 per day.
- Poverty affects many quality-of-life indicators.

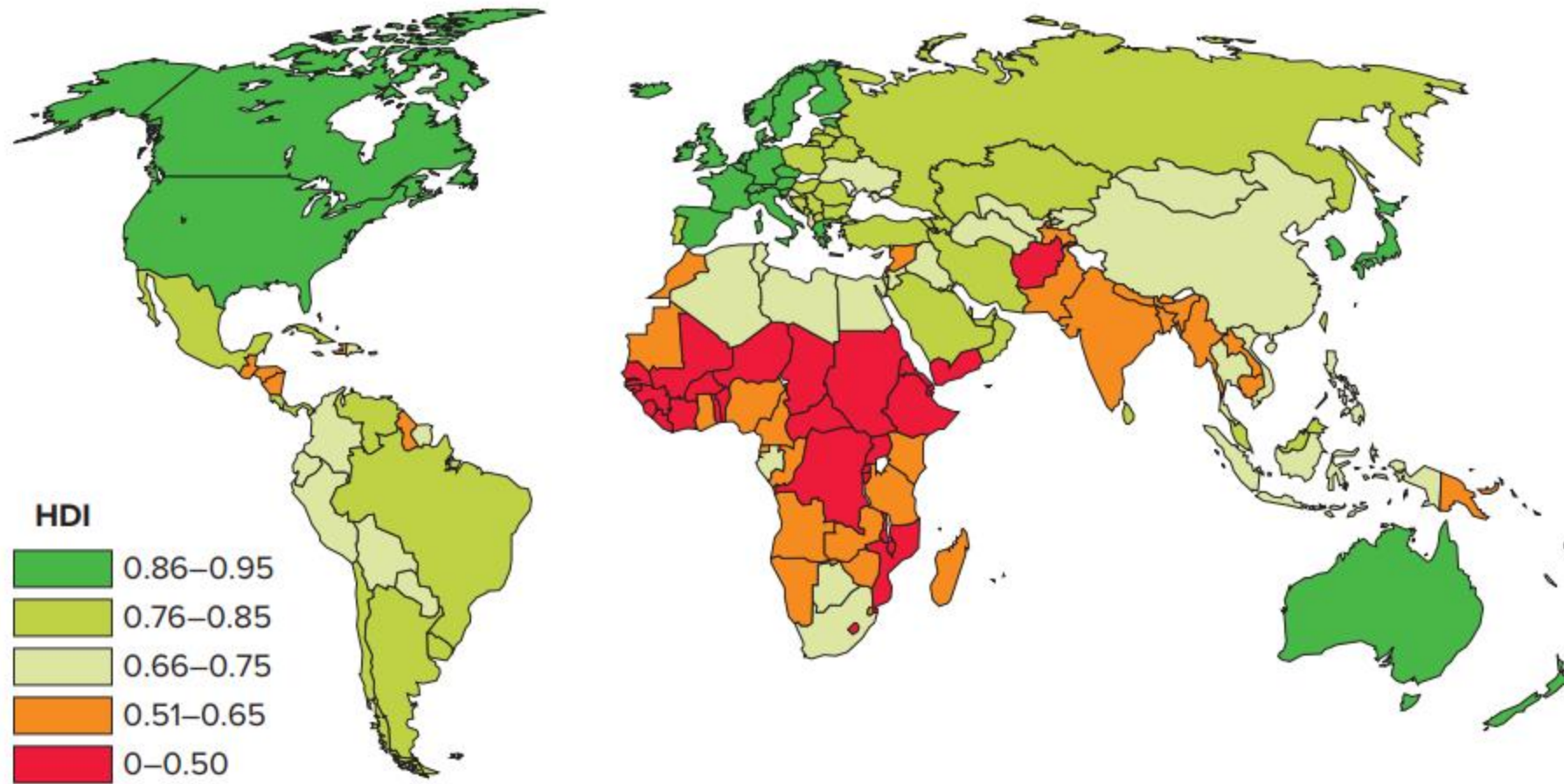


FIGURE 1.14 Human Development Index. Values near 1 represent strong health, education, and quality of life indicators.

Source: UNEP 2016.

The Human Development Index (HDI) is an index that aggregates factors such as health, education, and poverty.

Affluence is a goal and a liability

- USA with about 4.6 percent of the world's population, consumes about 20 percent of all oil, and produces about 15 percent of all carbon dioxide and half of all toxic wastes in the world. Low-income countries hope to emulate this prosperity.
- China in 1960s: about 300 million suffered from hunger and 50 million starved to death in a famine.
- Annual per capita GDP has grown from less than \$200 per year to more than \$12,000. Chronic hunger has become uncommon.
- As a consequence of this growth, pollution has become more severe each year, as demand has exploded for resources, consumer goods, cars, and other luxuries.
- In terms of ecological footprints, it takes about 9.7 global hectares to support the average American each year. In China it takes about 2.1 gha/year.
- It would require about 10 billion gha to provide Chinese with American standards of consumption.

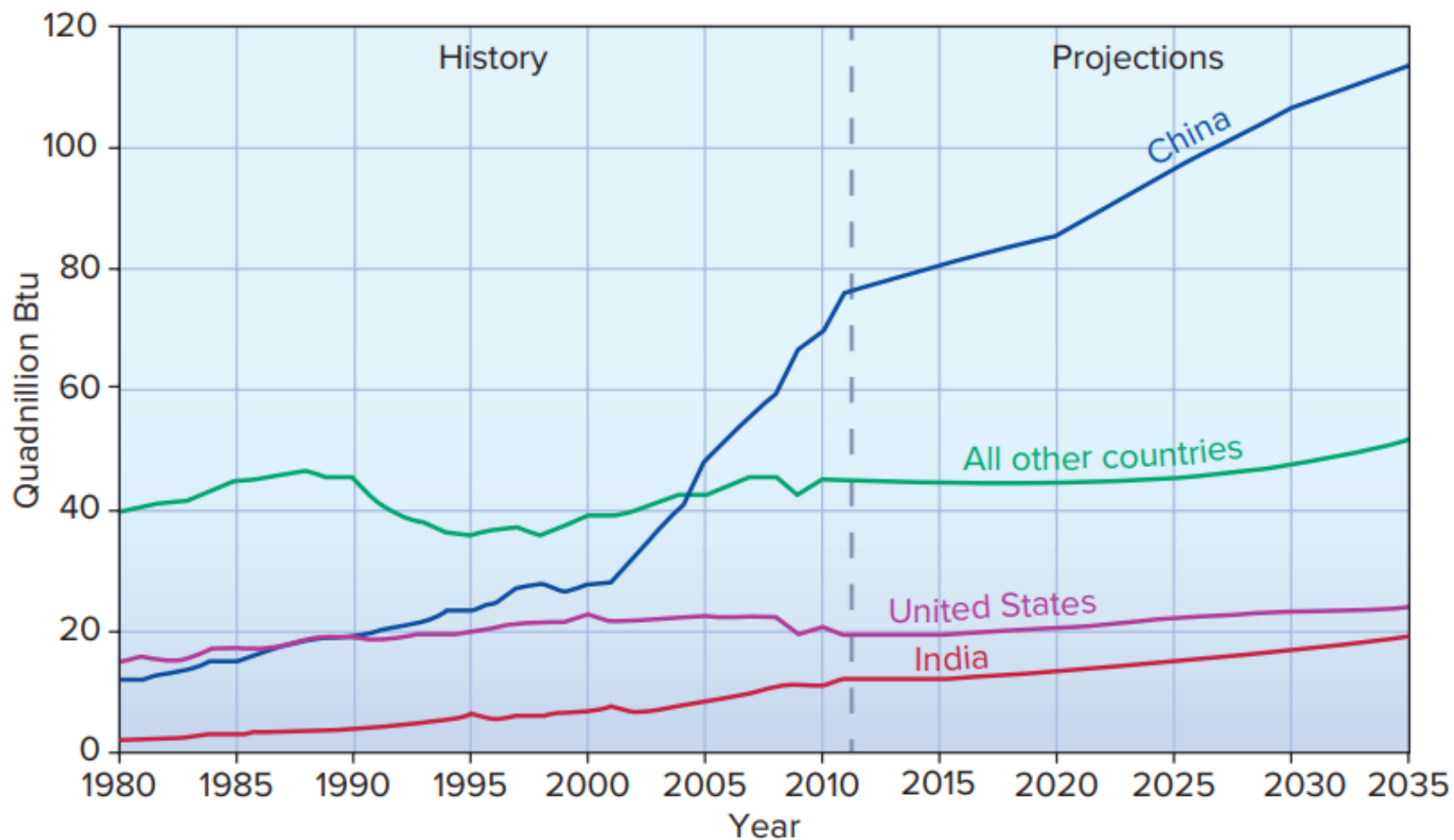


FIGURE 1.17 Coal consumption, most of it used for electricity generation, has fueled much of China's recent growth. Because coal is our primary source of air pollutants and greenhouse gases, projected increases would be disastrous.

Source: US Energy Information Agency 2013.

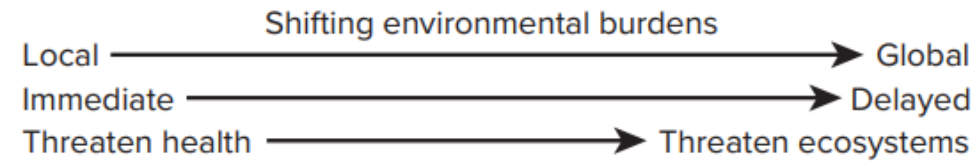
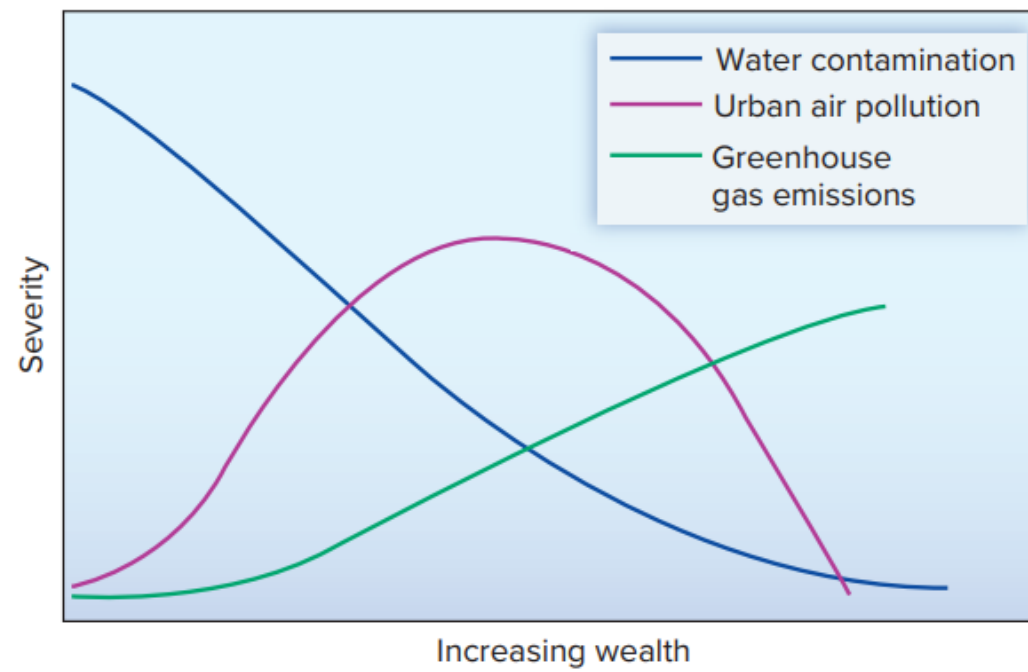


FIGURE 1.18 Environmental indicators show different patterns as incomes rise. Water contamination decreases as people can afford wastewater treatment and drinking water filtration. Local air pollution, on the other hand, often increases as more fuel is burned; eventually, development reaches a point at which people can afford clean air technology. Delayed, distant problems, such as greenhouse gas emissions that lead to global climate change, tend to rise steadily with income because people make decisions based on immediate needs and wants rather than long-term consequences. Thus, we tend to shift environmental burdens from local and immediate to distant and delayed if we can afford to do so.

Source: World Energy Assessment, UNDP.

Is sustainable development possible?

Herman Daly in 1970s put forth two basic principles-

1. We cannot consume natural resources faster than they are produced.
2. We cannot produce waste faster than nature can recycle it, if we intend to be here for the long term.

Sustainable development can mean many things. It may be distributing investment to small producers who circulate money in their local communities. Eg. Fair trade organizations, help people in developing countries to grow or make high-value products—often using traditional techniques and designs—that can be sold on world markets for good prices.



FIGURE 1.19 A Mayan woman from Guatemala weaves on a back-strap loom. A member of a women's weaving cooperative, she sells her work to nonprofit organizations in the United States at much higher prices than she would get at the local market.

Barry Barker/McGraw-Hill Education

Examples of sustainable development

- By 2015, Kenya produced more than half its electric power from geothermal, wind, and solar energy sources.
- The World Bank calculates that Sub-Saharan Africa could produce 170 gigawatts of low-carbon energy.
- In the Americas, Uruguay achieved 95 percent renewable electricity due to a decade of policy commitment.
- Costa Rica, with abundant geothermal energy, is approaching 100 percent renewable energy.
- Nicaragua is aiming for 90 percent renewable energy by 2020.

Examples of sustainable development

- Growth can also occur without increased resource consumption.
- Markets in arts, entertainment, education, services, and leisure time can improve our lives with little environmental cost.
- John Stuart Mill, an economist, said in 1857: "It is scarcely necessary to remark that [resource limitation] implies no stationary state of human improvement. There would be just as much scope as ever for all kinds of mental culture and moral and social progress; as much room for improving the art of living and much more likelihood of its being improved when minds cease to be engrossed by the art of getting on."

Major Themes of sustainable development

- **Interdependence:** The environment, economy, and society are interconnected, requiring integrated approaches to address challenges.
- **Global Equity:** Emphasizes reducing poverty and inequalities to achieve sustainability.
- **Environmental Limits:** Recognizes the finite nature of natural resources and the Earth's capacity to absorb waste.
- **Sustainable Economic Growth:** Advocates for growth that conserves resources and ensures long-term viability.

The UN has identified 17 Sustainable Development Goals

- In 2016, the United Nations initiated a program to promote 17 Sustainable Development Goals (SDGs).
- They include eliminating the most severe poverty and hunger, promoting health, education, and gender equality, providing safe water and clean energy, and preserving biodiversity.
- For example, Goal 1, "End poverty," includes targets to eradicate extreme poverty everywhere, and to ensure that all people have rights to basic services, ownership and inheritance of property, and other economic need.
- The global effort, developed by representatives of the member states of the UN, seeks to coordinate data gathering and reporting, so that countries can monitor their progress, share resources, and promote sustainable investment in developing areas.



FIGURE 1.20 The United Nations Sustainable Development Goals are intended to improve well-being of the world's poorest people while also protecting biodiversity, natural resources, and climate. These goals follow the largely successful Millennium Development Goals.

Source: UN Development Programme.

<https://www.youtube.com/watch?v=RmCH--xHT8>

<https://www.youtube.com/watch?v=ujpgvgxXYRI>

17 Sustainable Development Goals

- The UN aims to meet these targets by 2030, in a span of 15 years.
- The SDGs also include a number of targets for economic and social equity, and for better governance. Brundtland report emphasized that equity is also essential: Political stability, democracy, and fair access to resources and opportunity are needed to ensure that the poor will get a fair share of the benefits of greater wealth in a society.

The Millennium Development Goals were largely successful(from 2000 to 2015)

- The SDGs build on the remarkable (though not complete) successes of the **Millennium Development Goals**.
- These eight goals were a 15-year effort, from 2000 to 2015, to improve literacy, health, access to safe water, child survival, and other goals.
- Targets included ending poverty and hunger, universal education, gender equity, child health, maternal health, combating HIV/AIDS, environmental sustainability, and global cooperation in development efforts.

The Millennium Development Goals

- As a result, extreme poverty dropped from nearly half the population of developing countries to just 14 percent in only 15 years. The proportion of undernourished people dropped by almost half, from 23 percent to 13 percent.
- Primary school enrollment rates climbed from 83 percent to 91 percent in developing countries. Girls gained access to education, employment, and political representation in national parliaments.
- The UN reports stressed that many goals were not met. E.g. 2.6 billion people gained access to safe drinking water, but over 40 percent of the world's population still lacks access to piped drinking water at home.
- Having clearly stated goals, especially with quantifiable targets, is helpful.

Development depends on how wealthy countries allocate spending

- Economist Jeffery Sachs, director of the UN Millennium Development Project, said we could end extreme poverty worldwide by 2025 if the richer countries would donate just **0.7 percent** of their national income for development aid in the poorest nations.
- The United States, the world's largest total donor, sets aside only **0.16 percent** of its gross domestic product for development aid.
- These funds could be used for universal childhood vaccination against common infectious diseases, access to primary schools for everyone, family planning and maternal health services, safe drinking water and sanitation for all, food supplements for the hungry, and microcredit loans to promote self-employment.

Development depends on how wealthy countries allocate spending

- The United Nations Development Programme has estimated that it would take about (U.S.) \$135 billion per year to abolish extreme poverty and the worst infectious diseases over the next 20 years.
- This amount is comparable to the \$120 billion in subsidies and tax breaks the U.S. government gives to oil companies each year.
- And it's far less than \$1 trillion of global military spending each year.

"If you want peace, work for justice."



FIGURE 1.21 Every year, military spending equals the total income of half the world's people. The cost of a single large aircraft carrier equals 10 years of human development aid given by all the world's industrialized countries.

Source: Kyle Gahlau/DVIDS.

What can you do?

<https://www.globalgoals.org/take-action/?id=1>

Did you know?

While an estimated 735 million people go hungry globally, food loss and waste generate 8 to 10 percent of GHGs and is a methane hotspot.

Households waste over 1 billion meals worth of edible food every day, the equivalent of 1.3 meals every day for everyone in the world affected by hunger