Key Environmental Issues and Sustainable Living
IPAT Equation

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IPAT Equation
Paul Ehrlich and John Holdren Model

IPAT Is Another Environmental Impact Model

In the early 1970s, scientists Paul Ehrlich and John Holdren developed a simple model showing how *population size* (P), *affluence* (A), or wealth, as measured by rates of resource consumption per person, and the beneficial and harmful environmental effects of *technologies* (T) help to determine the *environmental impact* (I) of human activities. We can summarize this model by the simple equation:

$$\text{Impact (I)} = \text{Population (P)} \times \text{Affluence (A)} \times \text{Technology (T)}$$

IPAT – High/middle/low Income Countries

TABLE 1.1 Environmental Impact of Selected High-, Middle-, and Low-Income Countries

Country	Population Size	Population Growth Rate	Resource Use Per Person	Use of Harmful Technology	Use of Beneficial Technology	Overall Environmental Impact
High-Income Countries						
United States	316 million	Moderate (0.5%)	Very high	Moderate	High	High
Japan	128 million	Negative (−0.2%)	High	Moderate	High	Moderate
Germany	82 million	Negative (−0.2%)	High	Moderate	High	Moderate
Middle-Income Countries						
China	1.35 billion	Moderate (0.5%)	Low	High	Moderate	High
India	1.26 billion	High (1.5%)	Low	High	Low	High
Brazil	194 million	Moderate (1%)	Low	High	Moderate	Moderate
Low-Income Countries						
Nigeria	402 million	High (2.6%)	Very low	High	Low	Moderate
Bangladesh	228 million	High (1.6%)	Very low	High	Low	Moderate
Congo	194 million	High (2.8%)	Very low	High	Low	Moderate

Compiled by the authors using data from Population Reference Bureau, Global Footprint Network, World Wide Fund for Nature, and Earth Policy Institute.

Some forms of technology such as polluting factories, gas-guzzling motor vehicles, and coal-burning power plants increase environmental impact by raising the harmful T factor. But other technologies reduce environmental impact by decreasing the T factor. Examples are pollution control and prevention technologies, fuel-efficient cars, and wind turbines and solar cells that generate electricity with a low environmental impact. These and newer technologies to come can help us reduce our ecological footprints and expand our beneficial environmental impact.

Thank You