



Overview

(/study/app/

4. The global economy / 4.7 Sustainable development

186-

cid-

754025/



(https://intercom.help/kognity)



What is development?

Section

Feedback

Table of
contents

Notebook



Glossary

Reading
assistance

Development, very simply, means change. You have already seen the key concept of change many times in this course. However, in the context of economics, development means more than change. It refers to an *improvement* in people's standard of living; a change in people's lives for the better over time. Thus, we see the connection to another key concept of the course: economic well-being.

The material dimension of development

Until relatively recently, the study of development in economics was focused mainly on economic growth. Economists assumed that if a country's economy and incomes were growing, then people's lives would improve. That is because increased incomes enable people to consume more goods and services that can improve their well-being, including food, water, housing, clothing, and merit goods such as education and medical care. This can trigger a positive feedback loop, where improvements in human capital support further economic growth, which in turn support more economic growth. There is a clear connection between income growth and improved material standards of living.



Figure 1. Until recently economists focused on growing economies and incomes to support development.

Source: "[Make Poverty History](https://www.flickr.com/photos/psd/12383520) (<https://www.flickr.com/photos/psd/12383520>)" by Paul Downey is licensed under CC BY 2.0 (<https://creativecommons.org/licenses/by/2.0/>)

This approach of seeking development through economic growth has achieved some great successes. As you will learn in subtopic 4.8 (/study/app/pp/sid-186-cid-754025/book/the-big-picture-id-30432/), many development indicators have improved over time. The percentage of people living in poverty is declining, health and education have improved, and access to food, water and housing is greater than ever before. Material standards of living have improved for hundreds of millions of people in the last few decades.

However, it is important to note that economic growth, and the rising incomes that come with it, do not guarantee equitable or sustained improvements in human well-being. The limits of growth to achieve development will be explored in greater detail in subtopics 4.8 (/study/app/pp/sid-186-cid-754025/book/the-big-picture-id-30432/) and 4.10 (/study/app/pp/sid-186-cid-754025/book/the-big-picture-id-30433/).



The relational dimension of development

Overview
 (/study/app/186-cid-754025/book/what-is-development-id-30431)
 There is now a consensus that development is about more than improved access to food, water and health care. It is also about how well people can use what they have. As Nobel Prize winner Amartya Sen argued in *Development as Freedom* (1999), development entails increased freedoms or capabilities:



Figure 2. Amartya Sen.

Source: "Amartya Sen 20071128 cologne" (https://commons.wikimedia.org/wiki/File:Amartya_Sen_20071128_cologne.jpg) by Elke Wetzig is licensed under CC BY-SA 3.0 (<https://creativecommons.org/licenses/by-sa/3.0/deed.en>)

Development can be seen...as a process of expanding the real freedoms that people enjoy. Focusing on human freedoms contrasts with narrower views of development, such as identifying development with the growth of gross national product, or with the rise in personal incomes, or with industrialisation, or with technological advance, or with social modernisation. Growth of GNP or of individual incomes can...be very important as a means to expanding the freedoms enjoyed by the members of society. But freedoms depend also on other determinants, such as social and economic arrangements (for example, facilities for education and health care), as well as political and civil rights (for example, the liberty to participate in public discussion and scrutiny).



Development, in this view, means being able to do things and to achieve goals, to be free to pursue dreams and to have real choices about the future. Our social relationships and institutions play an enormous role in these freedoms, so achieving development cannot just be a matter of increasing incomes. Strategies and interventions to improve development must also pay attention to social and institutional relationships.

The subjective dimension of development

The material and relational dimensions may still fall short of a complete picture of development. Some economists and the [2019 UN Human Development Report](http://www.hdr.undp.org/en/2019-report) (<http://www.hdr.undp.org/en/2019-report>) propose that we should also examine the subjective dimension of development. This involves understanding what people value most in their own lives and taking account of how they would subjectively measure their own development against these values. The concepts of subjective well-being and subjective quality of life are important here.

This dimension of development, like the relational dimension, is difficult to measure. It is also framed by people's mental models: the assumptions, beliefs, and values that frame people's understanding of how the world works and their place in it. So even when we do attempt to measure it, for example with the Cantril ladder that is used in the [World Happiness Report](https://worldhappiness.report/ed/2020/) (<https://worldhappiness.report/ed/2020/>) and discussed in [subtopic 3.1](#) ([/study/app/pp/sid-186-cid-754025/book/the-big-picture-id-29927/](#)), we do not really understand all the complexity that lies behind the results.

Theory of Knowledge

Development is a broad concept referring to improvements in access to fresh water, nutrition, education, employment, and health care. It includes freedom of speech and freedom from oppression.

This makes development difficult to measure and to quantify.

Each year, the UN publishes the World Happiness Report. It ranks national happiness based on survey responses from local residents. In [2019 Finland grabbed the top spot](#) ↗

(https://en.wikipedia.org/wiki/World_Happiness_Report). The criteria measured by the World Happiness Report include: business & economics, citizen engagement, communications & technology, diversity (social issues), education & families, emotions (well-being), environment & energy, food & shelter, government and politics, law & order (safety), health, religion & ethics, transportation and work.

In 2012 Bhutan felt that Gross National Happiness was a much more effective indicator of development than GDP and adopted it as its indicator for development.

Knowledge question: Consider Bhutan's decision to measure development through the World Happiness Index. To what extent does this make Bhutan's measurement of 'economic development' unscientific?

Development: non-linear and emergent

Many economists now argue that if we want to foster equitable, long-lasting development, we need to view the environment, societies and their economies as complex systems. A complex system is a special kind of system, where many different parts interact in often unpredictable ways and on different scales to create patterns and behaviours that are greater than or different from the individual parts.

One characteristic of complex systems, and thus of development, is non-linearity. A system is non-linear when the input and output of a system are not proportional to each other. When we put two or more things together, the result is not necessarily the simple addition of them. Positive feedback loops in such systems can cause rapid change, faster than linear predictions would suggest. Negative feedback loops in such systems can result in greater stability than predictions would suggest.

Another characteristic of complex systems, and thus of development, is emergence . Emergence occurs when the whole is greater than and qualitatively different from the sum of its parts. For example, this phenomenon can be seen in groups of insects or people (**Figure 3**), where their interaction produces complex behaviours as a collective that are both greater than and different from their individual actions put together.

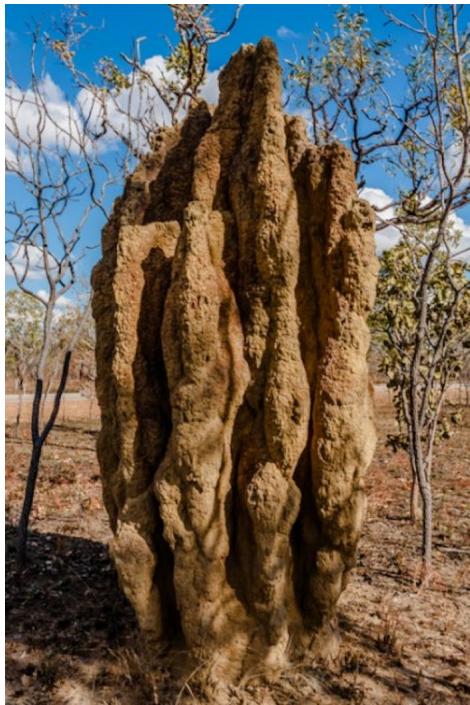


Figure 3. Termite cathedrals.

Credit: Getty Images vdvornyk

It may be helpful to think of development as a non-linear, emergent property of complex environmental, social and economic systems that are interdependent. Development does not come from simple *if-then* conditions. It is not appropriate to say that **IF** you grow incomes, **THEN** development will occur.

In development economics we will see the limits of the simple market models you have learned about in this course. Development economists need to be sensitive to context, understand the complex interdependencies of multiple systems and scales, and avoid applying predetermined strategies and one-size-fits-all solutions to development problems.

Complete section with 3 questions

Student view

Start questions

◀ Previous section (/study/app/pp/sid-186-cid-754025/book/the-big-picture-id-30430/)

Next section ➤ (/study/app/pp/sid-186-cid-754025/book/wh...

What is sustainable development?



Table of contents

The Great Acceleration

Notebook



Glossary



Reading assistance

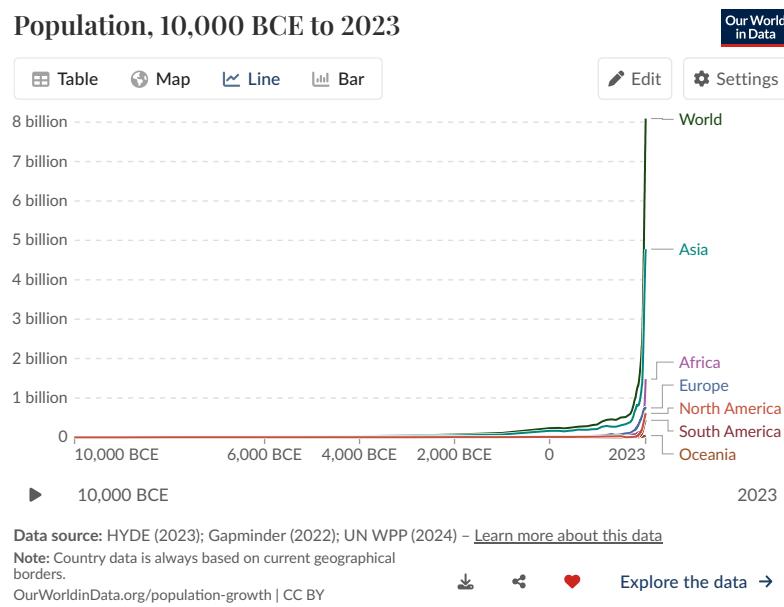
Related: [What sources do we rely on for population estimates?](#)

Figure 1. Human population growth has exploded since the Industrial Revolution.

Source: "World Population over the last 12,000 years and UN projection until 2100" (<https://ourworldindata.org/grapher/world-population-1750-2015-and-un-projection-until-2100>) by Our World in Data

 More information for figure 1



An interactive color-coded line chart presents global population trends from 10,000 BCE to 2023, illustrating the exponential growth of the world's population over time. The y-axis represents the population count, measured in billions, while the x-axis represents the timeline from 10,000 BCE to the present. The chart includes continents: Africa, Asia, Europe, North America, Oceania, and South America, each represented by distinct colors. For most of history, the global population remained relatively stable, with slow growth up until around 1800 CE. After the Industrial Revolution and advancements in medicine, agriculture, and sanitation, population growth accelerated dramatically. The sharpest rise occurred in the 20th and 21st centuries, with the global population surpassing 8 billion in 2023. Asia exhibits the highest population growth, followed by Africa, while other continents have smaller but still notable increases.

The chart allows users to interact by selecting or deselecting continents and regions through the panel on the right. Users can also adjust the time slider at the bottom to explore specific periods in history.

There is an option to analyze the data in table and map format. The map represents the population of each country using a color gradient, with darker shades indicating higher populations and lighter shades representing lower populations. The map highlights key population trends, showing that China and India have the highest populations, exceeding 1 billion people each. Other highly populated countries include the United States, Indonesia, and Brazil, while many smaller nations and island countries have significantly lower populations. Additional features include options to switch between Table, Map, and Chart views, providing users with multiple ways to analyze and compare global population data.

Learners gain insights into global population growth trends, understanding how historical events such as the Industrial Revolution, medical advancements, and agricultural developments influenced population surges.

Home
Overview
(/study/app/
186-
cid-
754025/)

The interactive **Figure 1** above shows the human population over the last 12 000 years. It is astounding to see how the world population has exploded since the Industrial Revolution in the mid-1800s. Improvements in fuels, technology, medicine, transportation and other areas have enabled longer, healthier lifespans. By 2100, the United Nations predicts the global population will be just under 11 billion people, about 3 billion more than we have now.

During the same period, we have also seen productivity and output grow immensely, resulting in rapid increases in gross domestic product (GDP). **Figure 2** shows the same hockey-stick shape of data over the same timeframe.

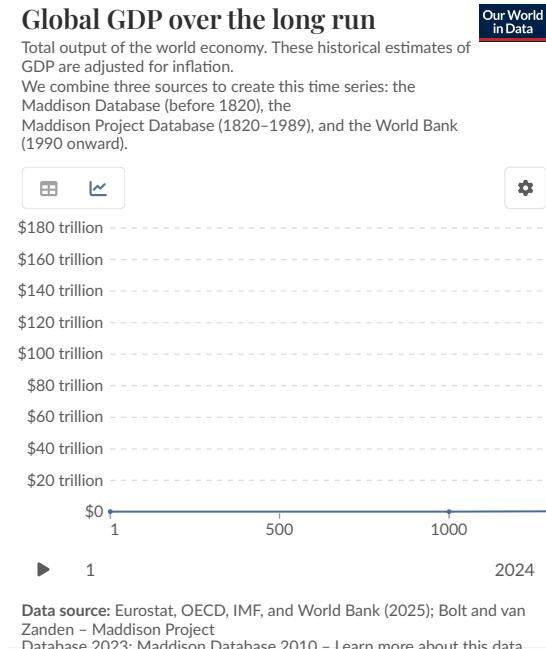


Figure 2. GDP growth over time.

Source: "World GDP over the last two millennia" (<https://ourworldindata.org/grapher/world-gdp-over-the-last-two-millennia>) by Our World in Data

[More information for figure 2](#)

Student view

An interactive line chart presenting data on global GDP over the long run, tracking the total output of the world economy from the year 1 CE to 2023. The x-axis represents the years, spanning over two millennia, while the y-axis measures global GDP in trillions of dollars. The data shows a prolonged period of minimal growth until the 19th century, after which a sharp rise occurs. The steepest increase is observed in the 20th and 21st centuries, particularly after 1950, reflecting rapid industrialization, technological advancement, and globalization.

A time slider at the bottom allows users to explore historical GDP trends dynamically, adjusting the view for different periods. Users can switch between table and chart formats for different data representations. The dataset, compiled from sources such as the World Bank and the Maddison Project, ensures the credibility of the information. Additional interactive features allow users to adjust settings, view specific timeframes, and access further details about the data sources.

The table tracks global GDP over the long run, comparing total world economic output from the year 1 CE to 2023. It includes columns for the year, total global GDP (measured in constant international dollars at 2021 prices), absolute change in GDP over time, and relative percentage growth.

By providing a long-term view of global economic development, this graph allows users to understand how the world economy has shifted, the causes behind periods of stagnation and growth, and the forces that shaped modern global economics. The interactive nature of the graph allows users to explore data in detail, offering insights into specific periods of economic transformation, especially when comparing the impact of events like the Great Depression and World Wars.

Activity

Use **Figure 2** above to practise calculating percentage change in GDP.



Remember that the formula for percentage change is:

$$\left(\frac{\text{Value 2} - \text{Value 1}}{\text{Value 1}} \right) \times 100$$

Consider calculating:

1. The percentage change in GDP from 1820 to 1950.
2. The percentage change in GDP from 1950 to 2015 (you may need to look at the CSV data to get the final value — just click on the DATA tab on the graph to download this).
3. The percentage change in GDP in 10-year increments from 1820 to 2010. What is the trend over time?
4. What is the significance of trends in GDP growth rates over time?

China, and Shenzhen in Guangdong province in particular, has been the most visible example of this acceleration. According to the United Nations, Shenzhen saw population growth of 6040% from 1985 to 2015, and in 2020 it is home to almost 12.5 million people. The rapid transformation of the city came after the area was designated the first of several special economic zones by the Chinese government in 1985. These zones used business-friendly economic policies to attract foreign direct investment (FDI) and stimulate economic growth. Not only did the population increase dramatically, but the use of land changed rapidly too. You can see the impact of this growth in Shenzhen on land use in the time-lapse satellite imagery in **Figure 3**.

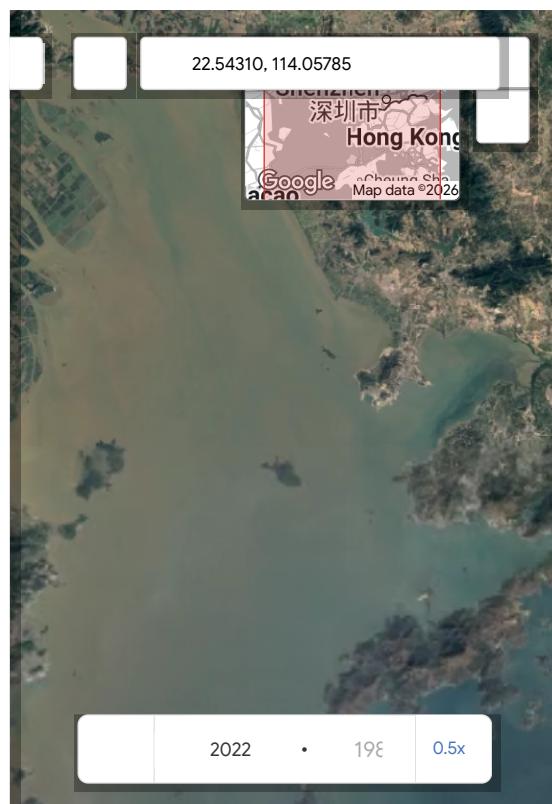


Figure 3. Rapid growth of Shenzhen, Guangdong, China, 1984–2018.

More information for figure 3

An interactive timelapse of satellite imagery of Shenzhen, China over time showing its transformation from 1984 to 2022. In 1984, the landscape was dominated by natural terrain, with visible mountains, water bodies, and relatively sparse urban development. The city appears to be in its early stages of industrialization, with limited infrastructure and urban spread. The coastline is relatively intact, and agricultural or undeveloped land is prominent. By 2022, there is a dramatic expansion of urban areas. The natural landscape has been significantly altered, with dense networks of roads, buildings, and industrial zones replacing much of the previous greenery. The city has sprawled outward, absorbing what were once smaller settlements and agricultural lands. Water bodies are still visible, but urbanization has encroached upon them, with noticeable land reclamation projects along the coastline. Infrastructure such as highways, bridges, and densely packed buildings dominate the scene, reflecting Shenzhen's rise as a global megacity and



technological hub.

Overview
(/study/app/
186-
cid-
754025/

Timelapse interactivity helps in observing the expansion of urban infrastructure, the transformation of natural landscapes, and the emergence of a dense metropolitan area. The Time Slider interface allows moving between different years, comparing Shenzhen's past (1984) with its present state. Zoom-and-Pan Capabilities, help focus on specific regions within Shenzhen, tracking industrial expansion, port development, and residential growth. Users can compare satellite views with a modern map by side-by-side reference to correlate past satellite imagery with current administrative divisions. The transformation is a striking example of rapid urbanization and economic growth, illustrating how Shenzhen evolved from a small town into one of the most developed cities in the world in just a few decades.

This dramatic increase in population growth and GDP growth, especially after 1950, is called the Great Acceleration. During this period, there have been enormous changes in societies and economies, with rapidly improving material standards of living.

However, there have also been increasing pressures on the environment in terms of resource use and degradation of the Earth's ecosystems. Those pressures are now so great that many scientists accept that we have moved into a new geological era, where human beings are the dominant force on the Earth's geology and ecosystems. This era is called the Anthropocene.

If these environmental pressures continue, they will threaten the prosperity that has been established since 1950. The United Nations estimates that more than 100 million people could fall back into poverty, and more than 200 million people could be displaced by more frequent natural disasters, such as floods, hurricanes, and droughts, which will be brought about by climate change in the coming years.

In this crowded, interconnected and interdependent planet, we need to focus our attention on sustainable development.



Student view

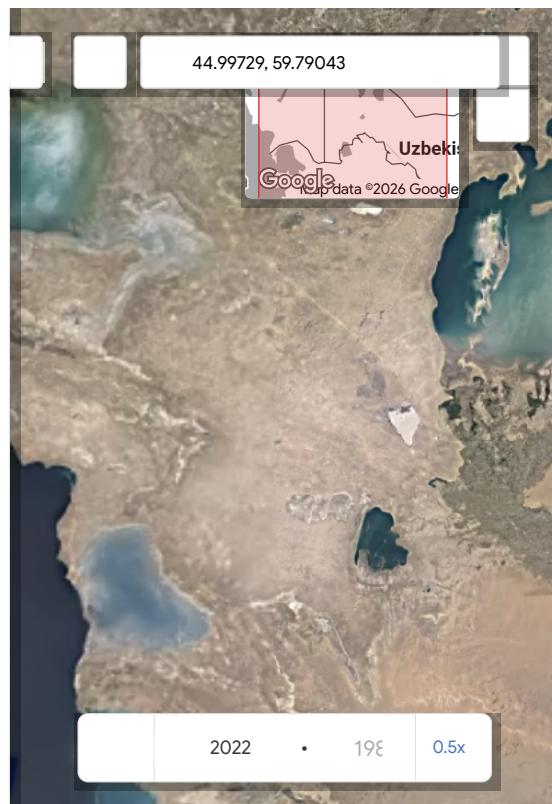


Figure 4. Time-lapse image of the Aral Sea drying out, caused by human activity.

More information for figure 4

An interactive time-lapse visualization showcases the dramatic transformation of the Aral Sea from 1984 to 2018, illustrating one of the most severe cases of environmental degradation caused by human activity. The 1984 image depicts a much larger and more connected body of water, with deep blue hues indicating extensive water coverage. In contrast, the 2022 image shows a drastically reduced water area, with much of the former lakebed exposed as dry land, some parts covered in salt deposits or desertification effects. The remaining water bodies are fragmented, with some areas still retaining a blue-green color.

The timeline control at the bottom allows users to navigate through different years, enabling them to track the environmental changes dynamically. The small inset map in the top right provides context for the geographic location. Zoom-and-pan controls give additional flexibility for exploring specific details in the landscape.

Users can scroll through different years and observe the gradual shrinkage of the Aral Sea over time. Time-lapse animation plays continuously to provide a seamless view of the lake's disappearance. This visualization serves as a tool for understanding environmental degradation, water management issues, and the long-term impact of human activities on natural resources.

Definition of sustainable development

In 1987, the Brundtland Commission – chaired by Gro Harlem Brundtland, who served as Prime Minister of Norway and Director-General of the World Health Organization (WHO) – released a report titled *Our Common Future* (also known as the Brundtland Report). This report contains the most frequently cited definition of sustainable development.

Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs. This definition recognises that resources are limited. It focuses on needs, particularly of the world's poorest, and contains the concept of intergenerational equity. This is the goal of fairness or justice between generations of human beings, young and old.



Figure 5. Gro Harlem Brundtland.

Source: "Gro Brundtland no Fronteiras do Pensamento 2014 (15229937917)" (<https://www.flickr.com/photos/fronteirasweb/15229937917/>)
by Fronteiras do Pensamento is licensed under CC BY-SA 2.0 (<https://creativecommons.org/licenses/by-sa/2.0/>)

Economist Jeffery Sachs has pointed out that the goal of sustainable development requires us to have a normative approach to economic activity and policy-making. In other words, we need to have a vision about what a 'good society' or the 'good life' should be. The United Nations has focused on four broad goals for humanity for the Sustainable Development Goals (SDGs) that you will learn more about in [section 4.7.5 \(/study/app/pp/sid-186-cid-754025/book/sustainable-development-goals-id-30435/\)](#). These goals are:

- prosperity (economic well-being)
- equity
- environmental stewardship
- good governance

Home
Overview
(/study/app/
186-
cid-
754025/

The first pillar of sustainable development, economic well-being, is being reached in large parts of the world. However, we need to ensure that the benefits are both inclusive and environmentally sustainable. This relies in large part on good governance, especially in the cities that are predicted to house up to 70% of the Earth's population by 2030.

Complete section with 3 questions

Section	Start questions	Feedback
---------	-----------------	----------

◀ Previous section (/study/app/pp/sid-186-cid-754025/book/what-is-development-id-30431/)

Next section ➤ (/study/app/pp/sid-186-cid-754025/book/what-is-sustainable-development-id-30434/)

✓
Student
view



Modelling sustainable development

Section

[Feedback](#)


Notebook As with many other subtopics, models can help us understand the meaning of concepts like sustainable development. In this section we will explore a number of models that can support your understanding of this important concept.



Nested, hierarchical dependencies

One way of modelling sustainable development puts the broad areas of environment, society and the economy in relationship to one another. This way of thinking about sustainability has evolved over time from what some people call a Mickey Mouse model to a nested dependencies model (**Figure 1**). In the latest version of this model, society and the economy are bound by the natural environment, and because of our dependence on it, the environment takes a higher position in the order of the three elements.

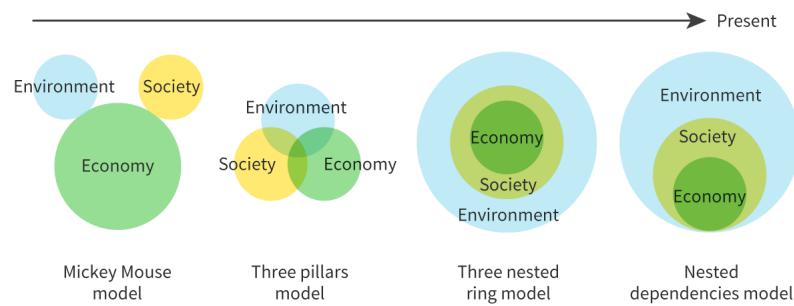


Figure 1. Models of sustainability over time.

[More information for figure 1](#)


The image illustrates the evolution of sustainability models over time, divided into four distinct models. From left to right:

1. **Mickey Mouse model:** Shows three separate circles labeled 'Economy', 'Environment', and 'Society'. The 'Economy' circle is the largest, with 'Society' slightly smaller and 'Environment' being the smallest, placed at the periphery of 'Economy'.
2. **Three pillars model:** The circles labeled 'Economy', 'Environment', and 'Society' partly overlap each other, forming a Venn diagram, symbolizing the interconnectedness among them.
3. **Three nested ring model:** Displays concentric circles with 'Economy' as the smallest, enclosed by 'Society', which in turn is enclosed by 'Environment'. This suggests that all elements are interconnected and mutually dependent.
4. **Nested dependencies model:** Similar to the previous model, but here the circles emphasize that 'Economy' is entirely dependent on 'Society', which is dependent on 'Environment', placing the environment in the most critical role.

The image indicates an arrow labeled 'Present' pointing right from the nested dependencies model, suggesting the chronological progression towards prioritizing environmental considerations.

[Generated by AI]



Activity

Consider the shape of the models in **Figure 1**.

- How do the types, sizes, position, and shape of the elements of the model affect their meaning?
- What do the models tell you about how our understanding of sustainability has changed over time?

The planetary boundaries model

Another very important model that has been developed since 2009 is the planetary boundaries model in **Figure 2**. The planetary boundaries model was proposed by a group of scientists led by Johan Rockström from the [Stockholm Resilience Centre](#) (https://en.wikipedia.org/wiki/Stockholm_Resilience_Centre) and Will Steffen from the Australian National University. It aims to define the safe operating space of economic activity within the limits of Earth's ecological systems.

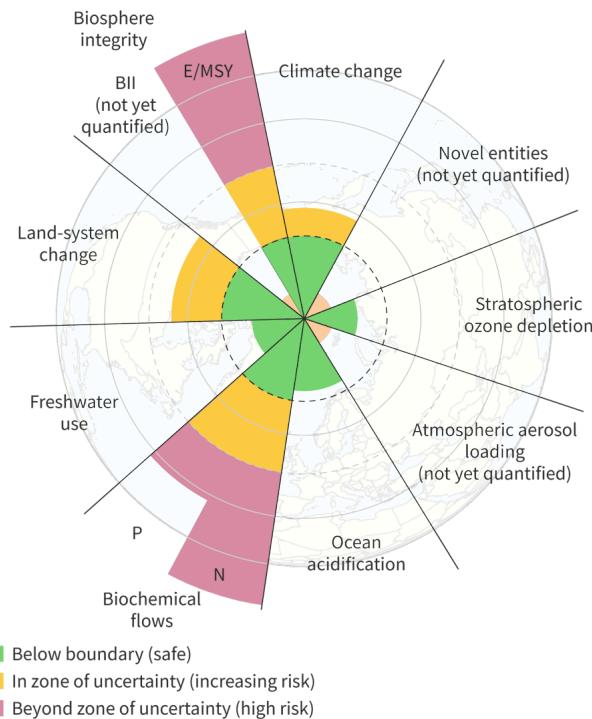


Figure 2. The Planetary Boundaries Model.

Source: "Planetary boundaries research (<https://www.stockholmresilience.org/research/planetary-boundaries.html>)"

[More information for figure 2](#)

The image is a circular graph representing the planetary boundaries model. It divides the Earth system into nine boundary dimensions, illustrating the safe operating space for human activities. The sections of the graph are color-coded to indicate different risk levels: green for below boundary (safe), yellow for zone of uncertainty (increasing risk), and red for beyond zone of uncertainty (high risk).

The nine dimensions include: 1. Biosphere integrity 2. E/MSY (Extinction rate) 3. Climate change 4. Novel entities 5. Stratospheric ozone depletion 6. Atmospheric aerosol loading 7. Ocean acidification 8. Biochemical flows (Phosphorus and Nitrogen) 9. Land-system change 10. Freshwater use

Each sector represents one dimension and is labeled accordingly around the circle. The extent of each colored segment indicates the current status and risk level for each dimension. Some segments, like climate change and biochemical flows, extend into the high-risk zone, while others, such as freshwater use, remain in the safe zone.

In the model above (which uses a circular sector graph, which you will also see in the doughnut model below and in section 4.7.8 ([/study/app/pp/sid-186-cid-754025/book/investigation-id-30437/](#))) you can see the nine boundary dimensions of Earth system processes, which include:

- Stratospheric ozone depletion
- Atmospheric aerosol loading (not yet quantified)
- Ocean acidification
- Biogeochemical flows (nitrogen and phosphorus cycles)
- Freshwater use
- Land-system change
- Biosphere integrity (biodiversity)
- Climate change
- Novel entities (not yet quantified)

In the centre of the model, you can see the green 'safe operating space' for human economic activity, bounded by the heavy dotted circle. According to the model, our economic activity is still in the safe operating space (though this is changing rapidly) in the dimensions of ocean acidification, stratospheric ozone depletion and freshwater use.

As economic activity grows, it continues to put pressure on environmental resources and the Earth's systems. The light orange/yellow range is a zone of uncertainty, where scientists believe we risk damaging these Earth system processes, some of which can have consequences for other dimensions in the model too. We have moved into the zone of uncertainty in the dimensions of climate change and land-system change.

Finally, the dark purple range indicates Earth system dimensions where we know we have overstepped the limits of the planet's boundaries. These include the biogeochemical flows (nitrogen and phosphorus cycles) due mainly to farming practices, and biosphere integrity due to loss of biodiversity.



① Exam tip

In this course, you are not required to memorise the nine planetary boundaries in this model or the social foundation in the doughnut model in the next section. You should, however, have an understanding of the structure of the models and the conceptual understanding of sustainability that they represent. You should be able to discuss these models in the context of economic activity and government intervention in economies.



The doughnut model

Overview
(/study/ap/
186-
cid-
754025/)

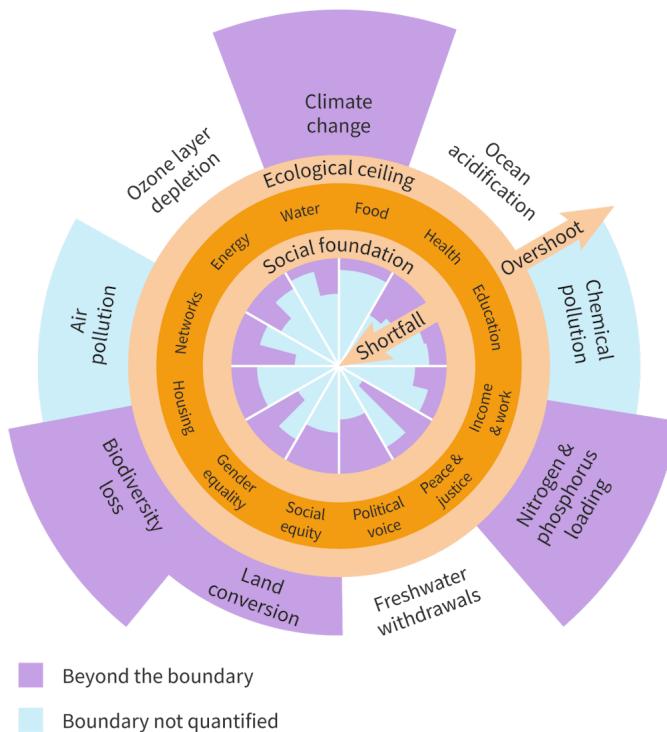


Figure 3. The doughnut model a safe and just space for humanity in the doughnut.

Source: "Doughnut (economic model)" [https://commons.wikimedia.org/wiki/File:Doughnut_\(economic_model\).jpg](https://commons.wikimedia.org/wiki/File:Doughnut_(economic_model).jpg)" by DoughnutEconomics is licensed under CC BY-SA 4.0 <https://creativecommons.org/licenses/by-sa/4.0/deed.en>

More information for figure 3

The image displays the doughnut model, an economic framework that visualizes a safe and just space for humanity. The model consists of two concentric rings: the outer ring, called the "ecological ceiling," defines the environmental limits of the planet, including factors such as climate change, ocean acidification, and chemical pollution. The inner ring, known as the "social foundation," outlines the minimum social standards for well-being, covering areas such as water, energy, education, and social equity. Between these rings is the "safe and just space" where humanity can thrive within environmental sustainability. The areas of "shortfall" are shown within the inner ring, indicating where social needs are not being met, while areas of "overshoot" extend beyond the outer ring, representing environmental boundaries that have been exceeded. The model emphasizes the balance between human needs and planetary boundaries to ensure sustainable development.



[Generated by AI]

The doughnut model was developed by the economist Kate Raworth. It builds on the planetary boundaries model, by adding human dimensions to the Earth system processes. The doughnut shows the idea of a safe and just space for humanity, where the needs of all are met within the limits of the planet.

Like the planetary boundaries model, the doughnut model uses the outer boundary of a circle to represent the limits of the Earth's systems. In this model the outer boundary is called the ecological ceiling. In the doughnut model, both the light orange areas and dark orange areas of the planetary boundaries model's zone of uncertainty exceed the ecological ceiling.

The hole in the middle of the doughnut represents basic human material and social needs. The red areas represent shortfalls in meeting basic human needs on some dimensions. So, for example, this model shows that globally, we are doing better on providing education and food than we are in health care and political voice.

 Adding the human dimensions to the planetary boundaries model is an important conceptual step because it incorporates the important goals of human well-being in the context of life-supporting Earth systems.

Overview (/study/app/186-cid-754025/)

The investigation in [section 4.7.8 \(/study/app/pp/sid-186-cid-754025/book/investigation-id-30437/\)](#) explores how countries compare on meeting the needs of all within the limits of the planet, based on data gathered using the dimensions of the doughnut model.

Case study

The doughnut model applied to Amsterdam



Figure 4. Amsterdam is applying the Doughnut Economics model.

In April 2020, the city of Amsterdam announced that it is going to apply the Doughnut Economics model to guide its goals and actions on sustainability, to help the city thrive within the bounds of the planet.

Kate Raworth used the model to provide a city portrait of Amsterdam. It helps to show the city's authorities where basic needs are not being met and where planetary boundaries are being exceeded. The [city portrait](#) (<https://www.kateraworth.com/wp/wp-content/uploads/2020/04/20200406-AMS-portrait-EN-Single-page-web-420x210mm.pdf>) displays how the issues are interlinked.

 Amsterdam has used housing to illustrate the approach. Currently, Amsterdam does not satisfy residents' housing needs. In 2018, 20% of city residents were unable to cover their basic needs after paying rent and in that year only 12% of 60 000 online applications for social housing were successful. Building more housing is one solution favoured by economists, but this is difficult because the city already exceeds planetary boundaries on carbon dioxide emissions. Among other measures, Amsterdam wants to pass regulations to ensure that builders use recycled and bio-based materials in construction.

Amsterdam is only the first of a number of cities planning to apply this approach. The city's steps to apply the model to guide concrete actions shows that abstract models are useful in practical application.

Access [Amsterdam's Doughnut Economics city portrait](#) (<https://www.kateraworth.com/wp/wp-content/uploads/2020/04/20200406-AMS-portrait-EN-Single-page-web-420x210mm.pdf>).

What areas does the city portrait identify for the people of Amsterdam:

- to thrive?
- to thrive within Amsterdam's natural habitat?
- to thrive while respecting the health of the whole planet?
- to thrive while respecting the well-being of people worldwide?

International Mindedness

Achieving sustainable development requires that countries work together to achieve prosperity, equity and environmentally responsible economic activity. In our globalised economic systems, it is clear that resources are extracted and moved across borders and that the consequences of economic activity in one part of the world affect other parts of the world. Our interconnection and interdependence is more apparent than ever before, requiring unprecedented levels of international cooperation.

You can see a focus on interdependence in the Amsterdam city portrait, in that it not only discusses what it takes for the people of the city to thrive, and to thrive in the local habitat, but also considers what it takes to respect the planet and other people worldwide.

The circular economy

Meeting human needs requires production of goods and services. Therefore, any discussion of sustainable development must consider how the goods and services we need can use production processes that reduce the impact on the planet's resources, from the perspective of both the use of resources and the impact of waste.

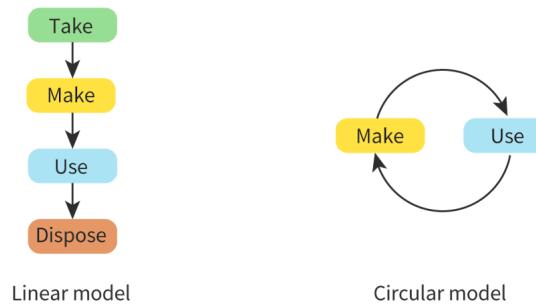


Figure 5a. Linear economy. **b.** Circular economy.

 More information for figure 5

The image features two diagrams side by side. On the left is the 'Linear model,' which illustrates a sequential process with the steps labeled as 'Take,' 'Make,' 'Use,' and 'Dispose,' arranged in a vertical line with arrows pointing downward connecting each step. This diagram represents the traditional linear economy model where resources are taken from the Earth, transformed into products, used, and then disposed of as waste.

On the right is the 'Circular model,' which shows a cyclic process diagram with steps labeled as 'Make' and 'Use,' connected by arrows forming a circle. This model represents a sustainable circular economy where goods are continuously reused, reducing waste and the need for new resources by maintaining products, materials, and resources in the economy for as long as possible.

[Generated by AI]

Our current production systems are overwhelmingly linear (**Figure 5a**). We take materials from Earth's resources, which we use to make products, and then we discard our waste. This is a take–make–waste linear system. Such a system will deplete Earth's resources over time as our populations and economies grow. It will also contaminate our ecosystems, damaging the essential services they provide to the planet and us.

One model for reducing the impact of our production systems is the [circular economy](#) (**Figure 5b**). The Ellen MacArthur Foundation outlines three principles for the circular economy:

- 'Designing out' waste and pollution

From the start of a product's conception, the goal is to design with circular intent. This requires considering the choice of materials, the production process, and the end of the product's life.

- **Keeping products and materials in use**

The goal is to make products last, through durable design, reuse, remanufacturing, recycling and the use of bio-based materials. This keeps materials circulating in the economy and avoids end-of-life waste.

- **Regenerating natural systems**

A circular economy uses renewable resources and works to regenerate resources over time. This can be done, for example, by returning nutrients to the soil.

Case study

BioPak: circular food packaging



Figure 6. Compostable packaging.

Credit: Getty Images anthonyjhall

The take-away food sector has been growing rapidly in recent decades. Because packaging is contaminated by food residues, recycling is often impractical and packaging ends up in landfills or incinerated.

BioPak makes take-away packaging from renewable plant-based sources. It also offers a collection and composting service to ensure that the packaging does not end up in landfills, but instead makes it back to the soil.

Since the launch of the company, use has expanded rapidly, it is used by more than 200 restaurants, has diverted more than 700 tonnes of waste, and has created 70 000 bags of reusable compost.

Read more:

[BioPak \(<https://www.biopak.com.au/>\)](https://www.biopak.com.au/)

[Closing the Loop in Single Use Packaging \(<https://www.ellenmacarthurfoundation.org/case-studies/closing-the-loop-on-single-use-food-packaging>\)](https://www.ellenmacarthurfoundation.org/case-studies/closing-the-loop-on-single-use-food-packaging)— Ellen MacArthur Foundation

- Explain how BioPak's business moves food packaging from a linear to a circular model. Use the three principles outlined in the text to help you explain your answer.
- Why is the composting part of the business so important to the circularity concept?

The video below explains the concept of the circular economy. You may find this helps you reinforce your understanding.

Home
Overview
(/study/app/sid-186-cid-754025/)



Explaining the Circular Economy and the Doughnut Model

Ellen MacArthur Foundation



Activity

Consider the uses and limitations of the four models introduced here: nested hierarchies, planetary boundaries, the doughnut and circular economy.

- What do they help you understand about the connections and interdependencies between environmental, social and economic systems?
- What do they leave out?

Complete section with 3 questions

Start questions

◀ Previous section (/study/app/pp/sid-186-cid-754025/book/what-is-sustainable-development-id-30434/)

Next section ➤ (/study/app/pp/sid-186-cid-754025/book/modelling-sustainable-development-id-30436/)

✓
Student view

Overview
(/study/app)186-
cid-
754025/

4. The global economy / 4.7 Sustainable development



(https://intercom.help/kognity)



The importance of resilience and culture for sustainable development

Table of
contents

Section

Feedback

Notebook

Glossary

Reading
assistance

Resilience

Sustainable development is closely tied to the Earth systems concept of resilience. Resilience is the ability of an individual, or systems like forests, cities or economies, to deal with change and continue to develop. It is about how well individuals and the systems in which they live can deal with all kinds of shocks (sudden change) and continue to operate and meet their own needs or the needs of stakeholders.

Activity

The [Stockholm Resilience Centre](https://www.stockholmresilience.org/) (https://www.stockholmresilience.org/) has a website with a lot of information about resilience and sustainability, including the link to culture explored below.

Take a little time to explore the website, especially the Key Concepts and News section on the homepage. There are many links to research papers on topics that could support extended essays in World Studies (where economics is one of the disciplines), ESS and other areas.

Student
view

Ecological resilience

Ecological resilience focuses on the fact that human beings and nature are interconnected. We cannot live without thriving ecosystems, and ecosystems are fundamentally shaped by people. We have been incredibly successful at modifying Earth's systems to serve our needs, but this often results in reduced resilience.

One example of this is farming. Over thousands of years, human beings have become increasingly successful at using land to grow food in ever more productive ways. We have always tried to increase yields, or the amount of food per hectare, and now have myriad strategies to achieve productive efficiency and economies of scale. One way of doing this is to specialise in singular crop production, called monoculture. Other strategies include the application of fertilisers, to compensate for the depletion of nutrients in the soil when we harvest crops, and the diversion of water resources from rivers in sophisticated irrigation systems. These methods have yielded an abundance of food globally, reducing hunger and malnutrition in many countries.

However, the strategies to increase food production have often undermined resilience. Monoculture farming has reduced biodiversity, making crops more vulnerable to disease. It has also made it more difficult for bee populations to find food over time, since monoculture crops bloom at the same time. A biodiverse diet is also thought to help bees themselves be more resilient. Monoculture farming could be one cause of bee colony collapse. Overuse of water, particularly for water-thirsty crops like cotton in drought-prone areas, has resulted in water insecurity in many regions of the world.

Ironically, our spectacular success at producing food could undermine our future ability to produce food. Many practices are simply unsustainable.



Figure 1. Monoculture farming, while productively efficient, undermines resilience and sustainability.

Credit: Getty Images simonlong

🔗 Making connections

Ecological resilience is an important concept in the IBDP Environmental Systems and Societies (ESS) course. Subtopic 1.3 of that book addresses the significance of resilience and the factors that can influence the resilience of an ecosystem. Additionally, resilience is a concept mentioned at multiple points in the IBDP Biology course.

Social resilience

Another facet of resilience is the importance of social networks: our social capital . Social capital refers to the way social groups function effectively through shared understandings, norms, values and cooperation. It is fostered through interpersonal relationships and social contact. Strong social capital creates more resilient societies that are able to withstand shocks, like natural or man-made disasters, and endure and continue to develop.

Social resilience in a community is fostered by building strong networks between people. One way of supporting social capital, and social resilience, is through social infrastructure. Parks, libraries and other public gathering places provide a place for social interactions to occur and interdependencies to develop. Institutions like schools and museums help develop a sense of values and shared identity. The sense of solidarity and cohesion that emerges from these networks can have enormous benefits for the health and resilience of societies and even the personal health and resilience of individuals.



Figure 2. Parks help build social resilience.

Source: "Greenwich Park # 1 (<https://www.flickr.com/photos/alanstanton/15080619725/>)" by Alan Stanton is in public domain.



Economic resilience

Overview

(/study/app

186-

cid-

754025/

Economic resilience is also important to sustainable development. Being able to bounce back from external shocks, also called exogenous shocks, will support enduring prosperity, equity and environmental responsibility. Many countries in the world are highly vulnerable to exogenous shocks and struggle to provide inclusive development for their populations. Resilience to exogenous shocks is closely related to trade, because disruptions to trade flows are major exogenous factors affecting economies.

Research suggests that countries with resilient economies are more diverse and complex. Again we can see the role of complexity in our understanding of development. Countries with populations that have a diverse range of unique 'know-how', practical knowledge or expertise tend to have more complex economies and a greater ability to continue to expand that diversity. The level of collective learning in a population will feed into its production, and over time can contribute to greater economic resilience. Research suggests that more complex economies also have lower levels of income inequality. So while narrow specialisation may carry some efficiency benefits for a country, it may also undermine resilience and thus sustainable development.

Economic Complexity Index, 2012

The Economic Complexity Index (ECI) takes data on exports, and reduces a country's economy to two dimensions: (i) The number or 'diversification' of products in the export basket; and (ii) the quality, or 'ubiquity' of products in the export basket. This map shows ECI scores. The highest rank is 1 and corresponds to the country with the most diversified economy in that year.

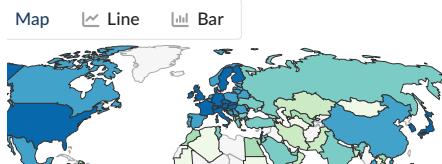


Figure 3. Economic Complexity Index 2016.

More information for figure 3

An interactive line chart presents data on the Economic Complexity Index (ECI) rankings from 1964 to 2016, showing the changes in the economic complexity of selected countries over time. In this chart, the y-axis shows the ranking position, where rank 1 represents the country with the highest economic complexity, and the x-axis displays the years from 1964 to 2016. The chart includes the countries Japan, Switzerland, South Korea, India, Mexico, Guatemala, and Côte d'Ivoire, each represented by differently colored lines.

For the year 2012, highly complex economies such as Japan, Switzerland, and South Korea are observed at the top of the chart with better ECI ranks, indicating that these countries exported a wide variety of specialized products like automobiles, electronics, and machinery. India and Mexico are positioned in the middle range, showing moderate economic complexity due to some diversification in their exports. In contrast, Guatemala and Côte d'Ivoire are ranked lower, reflecting lower economic complexity because of their limited range of exported products, mostly focused on raw materials. The interactive chart allows users to analyze the trends of these countries over time with a time-lapse at the bottom. It also offers options to view the data in table, map, or chart formats and to download or share the visualization.

This visualization offers a comprehensive perspective on global trade patterns, highlighting how countries develop and refine their export industries. By interacting with the dataset, users can identify long-term economic trends, compare regional complexities, and gain a deeper understanding of global

economic development through an engaging and data-driven experience. At the bottom, data sources and credits are provided, linking to the original research. Additional controls allow users to download the visualization, share it, or expand it to full-screen. They also provide a link for further exploration of how and why users should study 'economic complexity'.

Activity

Access the country rankings of economic complexity from either:

[Observatory of Economic Complexity \(MIT\) \(https://oec.world/en/\)](https://oec.world/en/)

[Atlas of Economic Complexity \(Harvard\) \(https://atlas.cid.harvard.edu/\)](https://atlas.cid.harvard.edu/)

Choose two countries to compare on economic complexity, a higher-ranking country and a lower-ranking country.

Explore the country profile data for each country and write a 1–2 page comparison of the economic complexity of the two countries, using data to support your comparisons. You will not be able to do a complete comparison. The point is to engage with and try to understand the data presented. The product space visualisations are particularly interesting.

- Which country might be more economically resilient? Why?

Of course there are also internal factors that contribute to economic resilience, such as the strength of political and social institutions, and the debt levels of households, companies and government. Strong, supportive political institutions and financial stability create flexibility and help people and their networks recover from a disruption.

Culture



Culture helps define people's relationship to others in society and the environment. It shapes their behaviours, values, beliefs and social norms. Cultures tend to take root in a specific environment and develop through interaction and adaptation to the natural systems of a place. As the [United Nations Educational, Scientific and Cultural Organization \(UNESCO\) \(http://www.unesco.org/new/en/culture/themes/culture-and-development/the-future-we-want-the-role-of-culture/the-key-ideas/\)](http://www.unesco.org/new/en/culture/themes/culture-and-development/the-future-we-want-the-role-of-culture/the-key-ideas/) points out, biological and cultural diversities are interdependent. Making appropriate use of the planet's resources must be done in a cultural context.

International Mindedness

Awareness and understanding of different cultures around the world is essential in making policies and interventions to support sustainable development. Development economists must thoroughly research and account for culture in their recommendations to improve sustainable development. Culture itself can also provide sustainable development strategies and can be a driver of sustainable development.

Culture is a source of sustainable development strategies

Cultural diversity can provide strategies for sustainable development. The way that people interact with nature and one another in one culture can offer important insights that can be transferred to other countries and regions. This can result in innovation in sustainable development strategies and interventions. For example, cultural differences in patterns of land use, consumption, production, and even building techniques can contribute to food and water security. Knowledge and practices that have been developed in different cultures over centuries of adaptation to changing climate conditions and social networks are an important source of ideas for improving sustainable development.

One important contribution to sustainable development comes from the concept of *sumak kawsay* (*buen vivir* in Spanish) from the Quechua people of the Andes. It describes a way of living that is focused on community, the environment and culture. [The Ecuadorian constitution ↗](https://pdba.georgetown.edu/Constitutions/Ecuador/english08.html) (<https://pdba.georgetown.edu/Constitutions/Ecuador/english08.html>) states that the country aims for 'a new form of public coexistence, in diversity and harmony with nature, to achieve a good way of living...a society that respects, in all its dimensions, the dignity of individuals and community groups.' *Buen vivir* is closely linked with various belief systems of indigenous people that are fundamentally more compatible with the goals of sustainable development and far more focused on holistic principles of harmony with nature and other human beings. Such belief systems are receiving far more attention as we look for mental models to guide strategies for sustainable development.

Effective development strategies must consider culture

For many decades, development strategies applied economic theories to different countries and regions without consideration of local conditions and culture. The historically narrow focus on economic growth tended to exacerbate this one-size-fits-all approach.

We now know that the complex systems driving development must integrate culture. Interventions to improve sustainable development will be more successful if they are culturally sensitive, because they will be more likely to appropriately affect systems and conform with people's mental models of the world. In addition, cultural engagement is likely to improve stakeholder agency in policies and programmes. It will also make better use of local knowledge, materials and skills.

⚠ Be aware

In [subtopic 4.10](#) ([/study/app/pp/sid-186-cid-754025/book/the-big-picture-id-30433/](#)), you will explore various strategies to promote growth and development. You need to keep in mind that these are standard approaches. Whether or not they improve development will partly depend on the complex systems, including cultural systems, of the country or region where they are implemented.

Case study

Maasai Boma Corrals



Credit: Getty Images MariusLtu



Credit: Getty Images Bartosz Hadyniak

**Figure 4. Maasai and Boma Corrals.**

The Maasai are a semi-nomadic tribe inhabiting central and southern Kenya and northern Tanzania. The Maasai migrate seasonally with their livestock, and use a system of mobile settlements and fences. Their movements create a system that reverses desertification and supports ecosystem resilience.

The fences alter the landscape around them. The layers of locally sourced materials that provide protection for the people and their livestock also provide shade for insects.. The natural fences also produce seed pods as food for animals and initiate desert afforestation. On a large scale, these fences and the movement of livestock trigger natural processes, like germination, and increase biodiversity in the ecosystem.

Misunderstanding of Maasai culture and the impact of their nomadic traditions on the environment led to government interventions to reduce and change the Maasai's traditional migration areas, and encourage and sometimes force them into sedentary lives.

- How might a better understanding of the complex systems involved in this socio-ecological context have resulted in different policies towards the Maasai?

Read more examples of the importance of culture in socio-ecological interdependencies:

Lo-TEK Design by Radical Indigenism by Julia Watson ↗(<https://www.juliawatson.com/>).

Culture can be a driver of development

UNESCO points out that culture, as a sector of economic activity, can also be a driver of development. The cultural resources of a group can generate jobs and income when investments are made to promote the traditions, identity and cultural services and products of a region. Governments and societies can invest in conserving cultural assets, including monuments, knowledge, skills and activities. Conserving these assets can strengthen both environmental sustainability and social capital.

Complete section with 3 questions

Start questions



◀ Previous section(/study/app/pp/sid-186-cid-754025/book/modelling-sustainable-development-id-30436/)

Next section ➤(/study/app/pp/sid-186-ci



Overview
(/study/app)

186-

cid-

754025/

4. The global economy / 4.7 Sustainable development



(https://intercom.help/kognity)



Sustainable Development Goals (SDGs)

Section

Feedback

Table of
contents

In 2015, the United Nations adopted a set of 17 ambitious goals to meet by 2030. These are called the Sustainable Development Goals (SDGs). These goals followed on from a set of 8 Millennium Development Goals whose target date was 2015.



Glossary

Reading
assistance

The short video below from the United Nations outlines the SDGs.

Do you know all 17 SDGs?



The 17 SDGs can be grouped into the four general categories that were briefly introduced in [section 4.7.2](#) ([\(/study/app/pp/sid-186-cid-754025/book/what-is-sustainable-development-id-30434/\)](#)). They are prosperity (economic well-being), equity, environmental stewardship and good governance. The 17 SDGs build on the 8 Millennium Development Goals. The expanded number and range of goals reflects our improved understanding of the interdependent nature of prosperity, equity, the environment and governance. However, monitoring such a large number of goals is difficult, particularly in cases where there are no clear indicators that can be measured. Some have even questioned whether all the goals are compatible. For example, to what extent is SDG 8, Decent Work and Economic Growth (particularly growth), compatible with SDG 13, Climate Action?

Student
view

SUSTAINABLE DEVELOPMENT GOALS



Figure 1. The Sustainable Development Goals.Source: 'Sustainable Development Goals (<https://www.un.org/sustainabledevelopment/>)' by UN and UNESCO

More information for figure 1

The image is a visual representation of the 17 Sustainable Development Goals (SDGs) by the United Nations, arranged in a grid format. Each goal is depicted in a colored square with a corresponding icon and a short description inside.

1. No Poverty - A family icon on a red background.
2. Zero Hunger - A bowl icon on an orange background.
3. Good Health and Well-Being - A heartbeat line with a heart on a green background.
4. Quality Education - An open book and pencil icon on a dark orange background.
5. Gender Equality - A gender equality symbol on a pink background.
6. Clean Water and Sanitation - A water tap icon on a light blue background.
7. Affordable and Clean Energy - A sun icon on a yellow background.
8. Decent Work and Economic Growth - A graph with growth trend on a dark red background.
9. Industry, Innovation, and Infrastructure - Geometric blocks on an orange background.
10. Reduced Inequalities - Arrows pointing in all directions on a pink background.
11. Sustainable Cities and Communities - Buildings on a yellowish-orange background.
12. Responsible Consumption and Production - A recycling symbol on an orange background.
13. Climate Action - A globe with an eye icon on a dark green background.
14. Life Below Water - A fish with waves icon on a blue background.
15. Life on Land - A tree on a green background.
16. Peace, Justice, and Strong Institutions - A dove with a gavel on a blue background.
17. Partnerships for the Goals - Colorful interlocking circles on a dark blue background.

[Generated by AI]

Targets and indicators

Student view

For each SDG, there are sets of targets and indicators. An SDG target is a narrower goal than the SDG itself. It provides a focus for concrete action to achieve the SDG. An indicator is how the target is measured. We keep track of data on the indicators to see how institutions can measure progress over time.

Case study

An example of targets and indicators



Figure 2. SDG 5: Gender Equality.
 Source: 'Sustainable Development Goals (<https://www.un.org/sustainabledevelopment/>)' by UN and UNESCO

SDG 5: Gender Equality

Achieve gender equality and empower all women and girls.

Target	Indicators
5.3 Eliminate all harmful practices, such as child, early and forced marriage and female genital mutilation.	5.3.1 Proportion of women aged 20–24 years who were married or in a union before age 15 and before age 18.
	5.3.2 Proportion of girls and women aged 15–49 years who have undergone female genital mutilation / cutting, by age

According to the United Nations, the indicator of child marriage (5.3.1) has been declining globally, especially in South Asia, where it decreased by about 25% between 2013 and 2018. In sub-Saharan Africa, child marriage has declined, but at a slower rate.

Available data suggests that at least 200 million girls and women are victims of female genital mutilation (indicator 5.3.2). The numbers are still unacceptably high but the practice declined by 25% between 2000 and 2018.

Read more:

[Progress on SDG 5](https://sustainabledevelopment.un.org/sdg5) (<https://sustainabledevelopment.un.org/sdg5>)— United Nations Yearly Update

[Gender Snapshot 2019](https://www.unwomen.org/-/media/headquarters/attachments/sections/library/publications/2019/progress-on-the-sdgs-the-gender-snapshot-2019-single-pages-en.pdf?la=en&vs=5813)
 (<https://www.unwomen.org/-/media/headquarters/attachments/sections/library/publications/2019/progress-on-the-sdgs-the-gender-snapshot-2019-single-pages-en.pdf?la=en&vs=5813>) — United Nations publication outlining the links between gender equality and the other SDGs, and highlighting some of the key accomplishments and work still to be done on SDG5.

1. What factors might have played a role in helping to reduce child marriages and female genital mutilation in the last 20 years?
2. What factors might have prevented more progress in reducing child marriages and female genital mutilation?
3. Browse the Gender Snapshot 2019. Describe a connection between SDG 5 and three other SDGs.

Progress on the SDGs

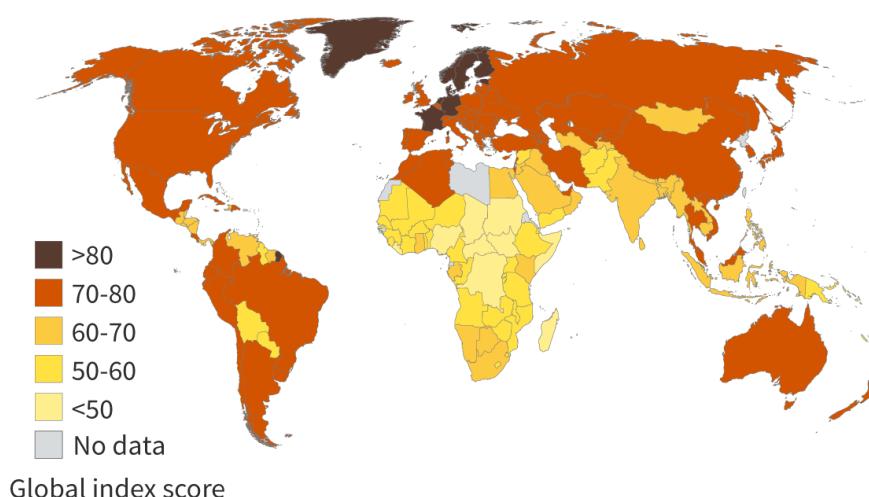


Figure 3. The Sustainable Development Goals Index.

Source: 'Sustainable Development Goals (<https://dashboards.sdgindex.org/map>)' by UN and UNESCO

The image is a color-coded world map displaying the Sustainable Development Goals (SDG) Index scores by country. The map has a legend on the left side indicating the score ranges with corresponding colors: dark brown for scores greater than 80, burnt orange for 70 to 80, medium orange for 60 to 70, light orange for 50 to 60, yellow for scores below 50, and gray to indicate no data available. The map illustrates that countries in North America, Europe, and parts of East Asia dominate the higher score ranges, while many countries in Africa and parts of the Middle East and South Asia fall into the lower ranges. Several countries, primarily in Africa, have no data available.

[Generated by AI]

Global progress on the SDGs is uneven. As you can see in the [Sustainable Development Goals Index ↗](https://dashboards.sdgindex.org/map) (<https://dashboards.sdgindex.org/map>), progress on the SDGs shows some patterns that may be correlated with the barriers to development that will be discussed in [subtopic 4.9 \(/study/app/pp/sid-186-cid-754025/book/the-big-picture-id-30278/\)](#).

However, it is clear that incomes and SDG progress are positively correlated. Higher-income countries tend to be closer to achieving the SDGs and have higher SDG Index scores than lower-income countries. For example, on SDG 3, Good Health and Well-Being, the [Index ↗](https://dashboards.sdgindex.org/map/goals/SDG3) (<https://dashboards.sdgindex.org/map/goals/SDG3>) clearly shows that lower-income countries have worse outcomes than higher-income countries.

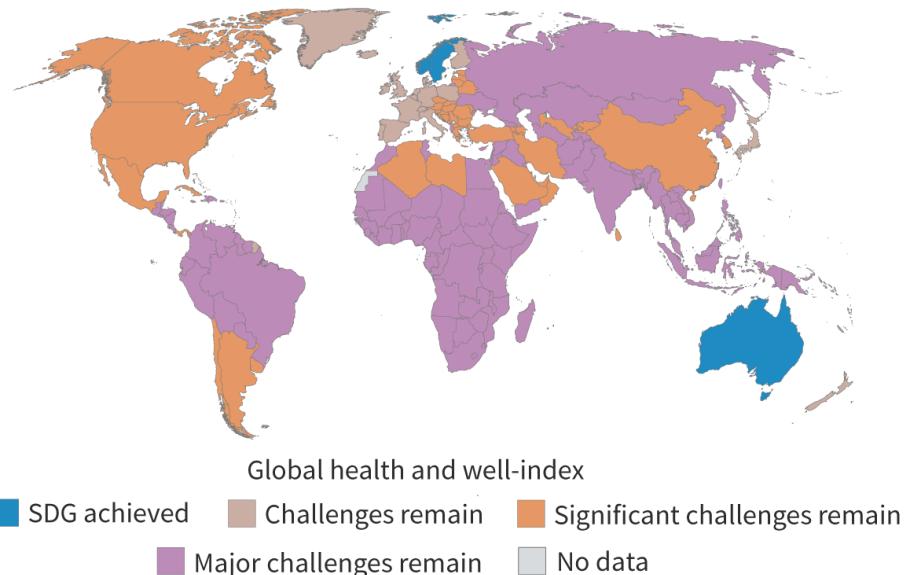


Figure 4. SDG 3: Good health and well-being.

Source: 'Sustainable Development Goals (<https://dashboards.sdgindex.org/map/goals/SDG3>)' by UN and UNESCO

 More information for figure 4

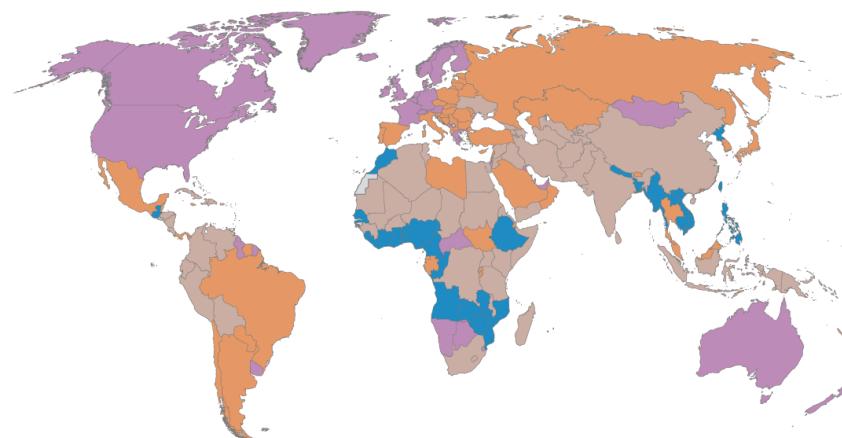
This is a world map illustrating the progress of countries on Sustainable Development Goal 3: Good Health and Well-being. The map is color-coded to show different levels of achievement:

- Countries where the SDG is achieved are marked in blue.
- Countries with remaining challenges are marked in a light brown color.
- Countries with significant challenges are shown in orange.
- Countries with major challenges are highlighted in purple.
- Areas without data are represented in white.

The map visually conveys that high-income countries like those in North America, Europe, and Australia have mostly achieved the goal, while many African and South American nations are still facing major challenges. This distribution indicates a disparity in health outcomes correlated with income levels, highlighting the need for focused efforts to address health and well-being in lower-income regions.

[Generated by AI]

However, there are some indicators where higher-income countries do not perform as well as lower-income countries. For example, [this map ↗ \(https://dashboards.sdgindex.org/map/goals/SDG12\)](https://dashboards.sdgindex.org/map/goals/SDG12) shows the SDG Index for SDG 12, Responsible Consumption and Production. High-income countries score poorly on this measure due to overconsumption and the linear production systems discussed in [section 4.7.3 \(/study/app/pp/sid-186-cid-754025/book/modelling-sustainable-development-id-30436/\)](#).



Responsible consumption and production

■ SDG achieved	■ Challenges remain	■ Significant challenges remain
■ Major challenges remain	■ No data	

Figure 5. SDG 12: Responsible consumption and production.

Source: 'Sustainable Development Goals (<https://dashboards.sdgindex.org/map/goals/SDG12>)' by UN and UNESCO

More information for figure 5

Student view

This colorful world map depicts the performance of different countries on SDG 12, which focuses on responsible consumption and production. The map uses a key to show different levels of achievement. Countries are color-coded as follows: blue indicates that SDG 12 is achieved, light peach represents that challenges remain, orange suggests significant challenges remain, purple highlights major challenges remain, and gray signifies no data available. Most high-income countries, indicated by purple, show major challenges, while some regions, like parts of Africa and a few in South Asia, are in blue or orange shades, denoting better progress or significant challenges. No-data regions are minimally visible, showing gaps in data collection.

[Generated by AI]

Each year, the United Nations releases the [Sustainable Development Report \(https://sdgindex.org/\)](https://sdgindex.org/) outlining the global progress on the SDGs. In 2019, the UN highlighted a number of concerns:

- The worst performance was on SDG 13: Climate Action, SDG 14: Life Below Water, and SDG 15: Life on Land.
- The authors noted that high income countries' consumption and production patterns had significant spillover effects (negative externalities) in other parts of the world, especially in terms of deforestation, and tolerance for poor labour standards in supply chains that affect women and children in particular.

- The report flagged that poverty rates, though significantly improved in recent decades, remain a stubborn problem in some countries.
- Armed conflicts in some parts of the world are reversing progress in SDGs.
- Negative trends in corruption and freedom of the press are worsening in more than 50 countries, including some middle- and high-income countries.

Activity

Access the [Sustainable Development Reports Dashboard](https://dashboards.sdgindex.org/#/) (<https://dashboards.sdgindex.org/#/>).

1. Select two countries and compare their progress on the SDGs.

Think carefully about which countries you will choose. Do you want to investigate and display data about similar countries? Very different countries? Or perhaps two countries you know nothing about?

1. Consider the best way to present your information in your comparison.

Who will your audience be? What will be the best way to display or discuss the information so that the audience understands the data?

Complete section with 4 questions

[Start questions](#)



[Previous section](#) (/study/app/pp/sid-186-cid-754025/book/the-importance-of-resilience-and-id-30438/)

[Next section](#)

> (/study/app/pp/sid-186-cid-

Section FeedbackTable of
contents

Notebook



Glossary

Reading
assistance**Exam tip**

The assessment objective for the relationship between sustainability and poverty is AO2. This means that you are expected to explain or describe this relationship.

Remember, however, that you may have to explain these relationships within the context of data or a stimulus text on the exam. It is very important that you understand a number of possible relationships between sustainability and poverty, as outlined below, so that you can make a suitable application between the theory and the stimulus text you are provided.

Poverty threatens sustainability

Poverty can result in unsustainable behaviour towards environmental resources, such as deforestation, land degradation and pollution of ecosystems. Often, where there is poverty, public resource and waste management systems are non-existent or do not work well.

Student
view

Plastic pollution is a good example of this. Many poor people cannot afford to buy full bottles of household and personal hygiene products. Private companies have made it easier for the poor to purchase small quantities of these products, so that they do not need to spend so much money at once. However, that means a lot more small single-use plastic packaging, called sachets. For example, according to The Global Alliance for Incinerator Alternatives (GAIA), 163 million pieces of plastic packaging per day, 60 billion per year, are consumed in the Philippines. The poorest areas of Manila are inaccessible to garbage trucks, so many of these pieces of plastic end up in waterways and clogging drains.

High-income countries use and dispose of more plastic per person. However, the management of plastic waste is a very important factor in whether the plastic pollutes the environment. In lower-income countries, up to 80–90% of plastic is not adequately disposed of, so far more of it enters ecosystems (**Figure 1**).



Overview
(/study/app-
186-
cid-
754025/)

Global mismanaged plastic waste, 2019

Mismanaged plastic waste is waste that is not recycled, incinerated, or kept in sealed landfills. It is burned in open pits, dumped into seas or open waters, or disposed of in dumpsites.

[Map](#) [Chart](#)



Figure 1. Poverty and poor waste management systems are correlated.

Source: "Share of global mismanaged waste, 2010" (<https://ourworldindata.org/grapher/mismanaged-waste-global-total>) by Our World in Data

More information for figure 1

The interactive map displays the share of global mismanaged plastic waste by countries in 2019. Mismanaged plastic waste refers to plastic that is not recycled, incinerated, or disposed of in sealed landfills, including materials dumped in open waters, burned in pits, or left in unsanitary landfill sites. The data is sourced from Meijer et al. (2021), providing insights into global plastic pollution trends and helping users understand which countries contribute most to mismanaged plastic waste. The map represents plastic waste mismanagement by shading countries based on their contribution—darker shades indicate a higher share of global mismanaged plastic waste, while lighter shades represent lower contributions. The data highlights key trends, such as higher mismanagement rates in densely populated and developing nations with limited waste management infrastructure, compared to lower rates in countries with more advanced waste disposal systems. Countries like India, China, and Indonesia face severe plastic waste mismanagement due to urbanization, high consumption, and weak infrastructure. Germany, Canada, and Japan efficiently manage plastic waste through advanced recycling and disposal systems. Southeast Asian and African nations struggle with waste management, while European and North American countries handle it more effectively. The Philippines, Vietnam, and Thailand contribute significantly to ocean plastic pollution due to poor waste control near coastlines.

The users can switch to table and chart format. The interactive bar chart illustrates the share of global mismanaged plastic waste in 2019. India (21.04%) and China (19.87%) lead as the largest contributors to mismanaged plastic waste, likely due to rapid urbanization, high plastic consumption, and inadequate waste disposal systems. The Philippines (6.52%) and Brazil (5.34%) also have significant mismanaged waste, indicating challenges in waste management infrastructure. Bangladesh (1.65%) and South Africa (1.15%) contribute smaller shares but still struggle with effective plastic waste disposal. The United States (0.43%) has one of the lowest shares, reflecting its advanced waste management and recycling systems.

The map discusses how high-income countries generate and dispose of more plastic per person but generally manage their waste more effectively. In contrast, lower-income countries often lack proper waste disposal systems, resulting in a much higher proportion of mismanaged plastic waste, with estimates suggesting that 80–90% of plastic in these regions is not adequately contained.

Users will gain insights into global plastic pollution, learning which countries struggle most with waste management and how this problem is distributed across the world.



Student
view



Figure 2. Filipinos Tackle Plastic Pollution At Manila's Bay.

Credit: Getty Images Jes Aznar / Stringer

The plastic bank

Plastic Bank is an organisation that offers people in poor countries money to collect plastic and deliver it for sorting and recycling.

Plastic Bank pays money into online bank accounts that can be used to buy things people need, including school tuition, power, high-efficiency stoves, medical insurance and many other items. Since Plastic Bank started operating, the collectors have retrieved almost 10 million kilograms of plastic from the environment, helping to cut off the flow of plastic to the world's oceans. The plastic is recycled and used by corporate partners in new packaging.

[Find out more about Plastic Bank \(https://plasticbank.com/\)](https://plasticbank.com/)

Monetising plastic waste, as Plastic Bank does, is one market-based solution to reducing plastic in the environment. It focuses on recycling to keep plastics in use.

- Considering the three principles of the circular economy model introduced earlier in [section 4.7.3 \(/study/app/pp/sid-186-cid-754025/book/modelling-sustainable-development-id-30436/\)](#), what other strategies could be used to fundamentally disrupt plastics' linear take—make—waste system?

As well as unsustainable behaviour towards natural resources, poverty may also cause unsustainable use of human resources. Child labour, which the International Labour Organization (ILO) defines as work that is mentally, physically, socially or morally dangerous and harmful to children, is one example of this. This work deprives children of their future, and damages the intergenerational equity that is central to the definition of sustainable development.

Unsustainable development threatens the poor the most

The global environmental damage caused by unsustainable development is affecting the poor the most and will continue to pose a disproportionate threat to them. Water stress, natural resource depletion, pollution and climate change all negatively affect people's health, well-being and incomes.

Many of the world's poorest live in or near vulnerable ecosystems such as floodplains, tropical rainforests, desert margins, islands and low-lying coastal areas. Vulnerable populations have experienced typhoons of greater frequency and intensity, unpredictable monsoon rains affecting farming, more intense and frequent droughts, flooding from intense storms, and sea-level rise and increased salinisation of freshwater sources.

The loss of human life, infrastructure and agriculture caused by these events has a huge negative impact on sustainable development in the social and economic spheres. The United Nations fears that climate change and ecological damage could undo the progress that we have achieved on development since the 1950s.



Figure 2. Tropical Storm Idai (2019) killed more than 1300 people in Mozambique, Madagascar, Malawi and Zimbabwe.

Source: "NASA - Aqua MODIS Satellite (https://commons.wikimedia.org/wiki/File:1IR_2019-03-09_1117Z.jpg)" by NASA is under [Public Domain](#) (https://commons.wikimedia.org/wiki/Category:PD_NASA)

Sustainability is critical to reducing poverty

It is clear that material standards of living need to improve in low-income countries. It is also clear that in the highest-income countries, generally good material standards of living have been achieved but overconsumption is a problem. The United Nations has made [equity](#) a central part of the [Sustainable Development Goals](#) to emphasise that greater fairness, or [distributive justice](#), is required to ensure that we meet the needs of everyone on the planet.

First, it is important that the highest-income countries, which are causing the most damage to global ecosystems with their consumption and production patterns, use their incomes and innovative capacity to move their economies rapidly towards greater sustainability. Having already achieved high levels of human development, they need to put less pressure on the Earth's resources to make room for the poorest to increase their material standards of living within the planet's boundaries. This may entail reconceptualising what the good life means, perhaps using the concept of *buen vivir* mentioned in [section 4.7.4 \(/study/app/pp/sid-186-cid-754025/book/the-importance-of-resilience-and-id-30438/\)](#).

Second, it is important that development strategies and governance for the world's poorest treat equity and environmental protection as parallel and equivalent to the goal of improved prosperity. The benefits of increased growth and incomes must be more inclusive if we are to achieve all 17 SDGs by 2030 and beyond.

Sustainability should not come at the expense of the poor

Finally, it is important to emphasise that efforts to improve sustainability should not be at the expense of impoverished and marginalised populations. Large-scale renewable energy projects, especially hydro-electric, but also solar and wind infrastructure, often involve the involuntary displacement of large numbers of people. As a result they lose their communities, livelihoods and culture. It can be very difficult for the poor to fight for their rights in the face of powerful commercial interests.

For example, in a very high-profile case, the project to build the Agua Zarca hydroelectric dam by the company Desarrollos Energéticos S.A. (DESA) in Honduras came under fire for violating the human rights of the indigenous community in the region. Prominent indigenous activist Berta Cáceres was murdered in 2016 for her attempts to protect indigenous rights against the commercial interests of the parties involved. In 2018, the Honduran National Criminal Court convicted seven men, hired by the executives of DESA, of her murder. The short video below, made before Cáceres' death, explains the attempts of the Leca people to protect their rights.



Figure 3. Berta Cáceres, campaigner for indigenous rights in Honduras.

Source: [Berta Cáceres \(cropped\) \(\[https://commons.wikimedia.org/wiki/File:Berta_C%C3%A1ceres_\\(cropped\\).jpg\]\(https://commons.wikimedia.org/wiki/File:Berta_C%C3%A1ceres_\(cropped\).jpg\)\)](https://commons.wikimedia.org/wiki/File:Berta_C%C3%A1ceres_(cropped).jpg) by UN Environment is licensed under CC BY 3.0 (<https://creativecommons.org/licenses/by/3.0/deed.en>)

Complete section with 3 questions

[Start questions](#)

[◀ Previous section](#) (/study/app/pp/sid-186-cid-754025/book/sustainable-development-goals-id-30435/)

Next section [▶ \(/study/app/pp/sid-186-cid-754025/book/relationship-between-sustainability-and-poverty-hl-id-30439/\)](#)