

# A sustainable future



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# A sustainable future

Sustainable development. What is it? How does it affect me?

How can schools contribute to sustainable development and how is it connected to the Nobel Prize?

This instructional package, entitled A sustainable future, enables students to discuss the United Nations Global Sustainable Development Goals from an interdisciplinary perspective. The package was developed on the basis of Swedish and international guidelines for teaching about sustainable development. It was produced in collaboration with the Swedish International Centre of Education for Sustainable Development (SWEDESD) at Uppsala University and Bifrost, an organisation led by educators and researchers from the Nordic Network for Interdisciplinary Environmental Studies (NIES) who work with numerous partners in civil society.

Many Nobel Prize-awarded innovations address problems related to sustainable development, for example energy-conserving LED lamps. Students will learn about several such examples, do assignments related to the Global Goals and watch a video about climate change. The video was produced especially for this instructional package. Students will have an opportunity to discuss the sustainability challenges that we and the world are facing.

**Grades 7–12:** Biology, physics, chemistry, geography and civics

**Length:** About 90 minutes

**Number of participants:** 4–32

**Space needed:** For group assignments (1–8 groups) plus lecture/debate for the entire class

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# A sustainable future

## OBJECTIVES OF THE INSTRUCTIONAL PACKAGE

Enabling students to . . .

- learn about the Global Goals and reflect on how they fit together.
- think about how they can act locally to contribute to sustainable development.
- learn how the achievements of several Nobel Laureates are connected to sustainable development.
- begin thinking about how they can personally contribute to sustainable development.

## PURPOSE

Increase students' knowledge of the 17 Global Goals and show the contributions of several Nobel Laureates to sustainable development.

## BRIEF DESCRIPTION OF THE PACKAGE

Sustainable development. What is it? How does it affect me? How can schools contribute to sustainable development and how is it connected to the Nobel Prize?

The instructional package entitled A sustainable future enables students to discuss the United Nations Global Sustainable Development Goals from an interdisciplinary perspective. The package was developed on the basis of Swedish and international guidelines for teaching about sustainable development. It was produced in collaboration with the Swedish International Centre of Education for Sustainable Development (SWEDESD) at Uppsala University and Bifrost, an organisation led by educators and researchers from the Nordic Network for Interdisciplinary Environmental Studies (NIES) who work with numerous partners in civil society.

Many Nobel Prize-awarded innovations address problems related to sustainable development, for example energy-conserving LED lamps. Students will learn about several such examples, do assignments related to the Global Goals and watch a video about climate change. They will have an opportunity to discuss the sustainability challenges that we and the world are facing.

# STRUCTURE – A SUSTAINABLE FUTURE

## 1. INTRODUCTION (15 MIN)

An introduction to the Global Goals and the connection between the Nobel Prize and sustainable development.

## 2. GAINING AN IN-DEPTH KNOWLEDGE OF THE GOALS – TUVALU (15 MIN)

*Use the story of Tuvalu as an example of how the goals fit together in one place (compare with the introduction, which is based on specific Nobel Prize-awarded achievements, and match them with Global Goals). Tuvalu is a small island nation that will disappear under the Pacific Ocean because of climate change.*

Read the story while clicking through the presentation slides.

## 3. GAME OF GOALS – RANKING THE GLOBAL GOALS (25 MIN)

*Students work in groups with a “Game of Goals” aimed at discussing the goals and making connections between them. The groups rank the goals at the global level, then at the local level.*

**STAGE 1. THE UN SECRETARY GENERAL (GLOBAL LEVEL).**

**STAGE 2. THE SCHOOL PRINCIPAL’S ADVISOR (LOCAL LEVEL)**

## 4. BRIDGE (7 MIN)

*Transition from the students’ work with all 17 Global Goals to the goal that the video focuses on: Goal 13 (Climate action). Further connections to Nobel Prize-awarded achievements, with ICCP and Al Gore as examples.*

## 5. VIDEO (15 MIN)

*The video focuses on the climate change issue and issues related to our lifestyle. It has three parts, including a description of the current situation and analysis of the climate change issue today. It closes on a hopeful note about what we can do about the climate change issue in the future.*

While watching, figure out a concrete action you could carry out aimed at one of the goals. Tip: Think about what goal you would like to improve at your school, or perhaps the video itself will give you another idea.

## 6. CONCLUSION (5 MIN)

The students should reflect on the video. The video is dramatic, and we need to tie together the programme after watching the video.

*Finally, the students should formulate their own concrete proposals for action, primarily based on the results of their work about the local level.*

**STAGE 3. CONCRETE PROPOSALS FOR ACTION (INDIVIDUAL LEVEL)**

# DESCRIPTION – A SUSTAINABLE FUTURE

## [1.] Introduction (15 minutes)

*Introduce the Global Goals, connect the Nobel Prizes with sustainable development, make it clear that the Goals are related to interdisciplinary problems that require interdisciplinary solutions and that affect all of us.*

*You will find the Global Goals at*

*[www.un.org/sustainabledevelopment/sustainable-development-goals](http://www.un.org/sustainabledevelopment/sustainable-development-goals)*

*and excerpts from the will of Alfred Nobel in PDF format in Appendix 1.*



In his will, Swedish inventor and industrialist Alfred Nobel (1833-1896) stipulated that those who have “conferred the greatest benefit to humankind” will be awarded a prize – what we now call the Nobel Prize. He also stipulated that the prize should go to the “worthiest person, whether or not they are Scandina-

vian.” In other words it does not matter where a person was born or what part of the world they live in.

Late in 2015, world leaders adopted 17 Global Goals aimed at achieving three fantastic things during the next 15 years:

- Abolishing extreme poverty.
- Reducing inequalities and injustices in the world.
- Solving the climate crisis.

These objectives can be achieved through the Global Goals for sustainable development – in all countries and for all people. If the goals are to succeed, everyone needs to know about them.

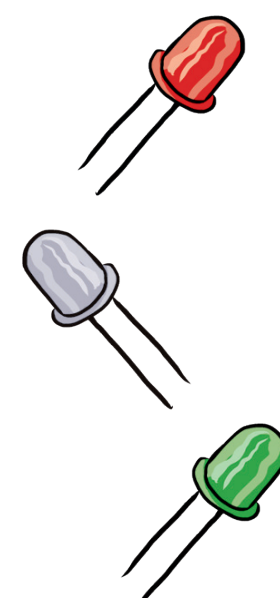
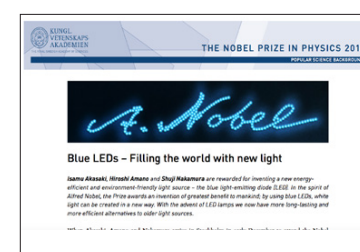
What, then, do the Nobel Prize and the Laureates have to do with the 17 Global Goals for sustainable development?

Looking at many of the achievements for which Laureates have been awarded the prize since it was launched in 1901, we find many connections to sustainable development in all of the prize categories. Although we now have six categories to choose from– Physics, Chemistry, Physiology or Medicine, Literature, Peace and Economic Sciences when providing examples of how the Nobel Prize can be connected to the Global Goals, we have selected two. Let us begin with two prizes that clearly illustrate this connection. The question is which of the Global Goals you can connect to these two examples:

### ISAMU AKASAKI, HIROSHI AMANO AND SHUJI NAKAMURA (PHYSICS, 2014)

*“for the invention of efficient blue light-emitting diodes, which has enabled bright and energy-saving white light sources”*

The three Laureates invented a new energy-efficient, environmentally friendly source of light, the blue light-emitting diode





(LED). The blue diode made it possible to create LED lamps that have low energy consumption, a long service life and a bright white light. In addition, LED lamps – unlike fluorescent lamps – contain no mercury. The LED lamp also holds great promise when it comes to the possibility of increasing the quality of life for the more than 1.5 billion people who currently lack access to electricity grids, as the low power requirements imply that the lamp can be powered by cheap local solar power. For more information, see:

[https://www.nobelprize.org/nobel\\_prizes/physics/laureates/2014/](https://www.nobelprize.org/nobel_prizes/physics/laureates/2014/)

(6) CLEAN WATER AND SANITATION

(7) AFFORDABLE AND CLEAN ENERGY

(9) INDUSTRY, INNOVATION AND INFRASTRUCTURE

(11) SUSTAINABLE CITIES AND COMMUNITIES

(12) RESPONSIBLE PRODUCTION AND CONSUMPTION

## MALALA YOUSAFZAI



**(PEACE, 2014)**

*“for their struggle against the suppression of children and young people and for the right of all children to education”*

Malala Yousafzai, who shared the Peace Prize with a children’s rights activist from India, comes from Pakistan and fought for the right of girls to an education. The Taliban did not approve of her campaign, and in 2012 she was shot and seriously wounded.



“One child, one teacher, one book, one pen can change the world.”

First speech after her injury, UN Headquarters, New York, 2013

She was only 17 years old when she received the Nobel Peace Prize, making her the youngest Nobel Laureate ever. When she got the news, she was in school. She said then that she wanted to wait until the end of the school day before commenting on the prize. More information:

[https://www.nobelprize.org/nobel\\_prizes/peace/laureates/2014/](https://www.nobelprize.org/nobel_prizes/peace/laureates/2014/)

(4) QUALITY EDUCATION

(5) GENDER EQUALITY

(10) REDUCED INEQUALITIES

(16) PEACE, JUSTICE AND STRONG INSTITUTIONS

## [2.] In-depth knowledge about the Global Goals – Tuvalu

(15 minutes)

*This is the story of Tuvalu, a country that is being swallowed up by the sea due to climate change and the resulting rise in water levels. While reading it aloud, click through the presentation to see how the various Global Goals fit into the story.*

*(The story and the slide show are available separately for downloading)*

Now we have talked about two different Nobel Prizes and what Global Goals are relevant to them. But how do the 17 Global Goals fit together? How can these goals affect a specific place – like the Old Town, the Stockholm Archipelago, the Isle of Man or Tuvalu, or perhaps a place somewhere in your country? This description was written by Petra Hansson, a researcher at Uppsala University in Sweden, and has been slightly updated. Her research focuses on sustainable development education.

1. Start the Keynote slide show about Tuvalu.
2. Don't read the goals; instead, change the slide for each goal.

### INSTRUCTIONS

Let me tell you a story about Tuvalu, a tiny little country in the middle of the South Pacific. Tuvalu consists of nine small islands. Five of them are coral reefs, and the biggest island is called Funafuti. (Click) What you see in this photo is Funafuti. The southernmost and northernmost islands in Tuvalu are 850 kilometres apart. The country's closest neighbours are Kiribati, Fiji and Samoa. Between them and Tuvalu, there is only water. Funafuti has 6,000 inhabitants, and Tuvalu's capital is located there. We can say that the island and the city are the same thing, since they are so small.

Funafuti, Tuvalu's biggest island, is only 12 kilometres long. At its widest, the island is a few hundred metres across. There are only about 11,000 people in all of Tuvalu, and the area of the country is only 26 square kilometres. At its narrowest, Funafuti is only 20 metres wide, so the island consists mostly of seaside and beaches. The highest point in Tuvalu is only 4.5 metres above sea level. The one hotel in Tuvalu is located here on Funafuti, and so is the country's largest and tallest building, which is three stories tall. The island's roads were paved not long ago, and cars drive slowly here, about 20 kilometres per hour. There is an airport

with one runway that offers air service to Fiji twice a week. Most of the time, the runway is used as a football pitch, and you can walk across it like any street.

CHANGE  
SLIDE!

Even though it looks like one in the photo, Tuvalu is not a tourist paradise. Because it is so remote you can't take a charter flight here, and very few tourists come to visit. Tuvalu is one of the world's least developed countries, and the people who live here have little resources. They mainly live from fishing and simple farming. So they live with the sea, but meanwhile the sea is also the country's biggest enemy. Because it is so small and is located in the middle of the Pacific Ocean very far from land, and because it is so flat, Tuvalu – like other small island states around the world – is especially vulnerable to bad weather, storms and drought. The people who live on these islands often also have few resources to protect themselves and lack the economic assets to invest in smart solutions for dealing with sustainability challenges. In fact, Tuvalu is in danger of being swallowed up by the sea.

The Department of Environment on Funafuti estimates that 30-40 years from now, Tuvalu will no longer exist, but will have disappeared under the Pacific Ocean. Now let's use the story of Tuvalu to give examples of how the Global Goals for Sustainable Development fit together.

CHANGE  
SLIDE!

#### **GOAL 14: LIFE BELOW WATER**

Due to global warming, the earth's climate is changing. You've certainly heard that the Arctic ice is melting, since climate change is causing warmer weather. This also affects small island countries, because when the world's ice melts the water gets warmer and the ocean surface rises. Tuvalu has been hit by more and harder storms and cyclones, and the number of floods has recently increased. Imagine what happens to the people, animals and plants in Tuvalu – which is so small and flat – when the water level rises.

Climate change is also making the weather more unpredictable and changeable in Tuvalu. The seasons are shifting. It used to be dry between April and October, but this is no longer true. Today it can rain when it used to be a dry period or vice versa. And today it rains more in Tuvalu than before.

The coral in the sea is damaged when the water becomes warmer, and it is also damaged by all the acid rain. If coral reefs are damaged, this also eliminates an important source of protection, since the reefs help keep waves from hit the islands so hard. Since it now rains more, and the water has become warmer, the islands are exposed to greater damage during storms and high waves. "Conserving and sustainably using the oceans, seas and marine resource for sustainable development", as Goal 14 states, is thus a major challenge for Tuvalu.

CHANGE  
SLIDE!

#### **GOAL 15: LIFE ON LAND**

When the sea level rises, and salt water pushes up onto land, this damages ecosystems and threatens biodiversity in Tuvalu. Storms in Tuvalu cover large parts of the islands with water. Salt water also surges up from the ground.

Trees and crops such as palms and banana plants suffer. There are not as many palm trees today, and since the vegetation is decreasing, today it is harder for the islands to resist rising sea water. And because the water is rising and vegetation is decreasing, land erosion eats up the land and makes it disappear. This is most noticeable on Tuvalu's smaller islands and means that many people from the smaller islands are being forced to move to the main island, Funafuti.

CHANGE  
SLIDE!

#### **GOAL 6: CLEAN WATER AND SANITATION**

Since sea water is salty, the groundwater in Tuvalu is also very salty. The poor supply of fresh water makes it hard to grow crops. Sometimes salt water bubbles up on the airport runway on Funafuti and penetrates into the lowest-lying houses. Although it rains more in Tuvalu today, the country has also suffered drought and periodic water shortages. Because of the country's isolated location, the islanders depend on outside help if there is not enough water. Water shortages also increase the risk of illnesses if there is not enough water for hygiene and a good wastewater system.

CHANGE  
SLIDE!

#### **GOAL 10: REDUCE INEQUALITIES**

Tuvalu is one of the world's least developed countries and is far down the list of the world's poorest countries, with a low gross domestic product (GDP).

CHANGE  
SLIDE!

#### **GOAL 1: NO POVERTY AND GOAL 2: ZERO HUNGER**

Tuvalu, which despite all of this has a fairly good economic situation, is entirely dependent on aid from other countries. Dried coconut is its only export product, and people live mainly from fishing and simple farming. Promoting sustainable agriculture – so that all of Tuvalu's inhabitants can obtain food – is a big challenge, since it is so hard to grow crops in order to achieve food security for everyone and thereby improve the quality of life for Tuvalu's inhabitants.

CHANGE  
SLIDE!

#### **GOAL 8: DECENT WORK AND ECONOMIC GROWTH., 11: SUSTAINABLE CITIES AND COMMUNITIES & GOAL 12: RESPONSIBLE CONSUMPTION AND PRODUCTION**

Because so many people are being forced to move to Funafuti, the island is densely populated. In many ways, the city of Funafuti is not a sustainable city. Having been self-sufficient on their home islands, people who move to Funafuti need to find jobs, but since the community has such weak infrastructure and low production – with a lack of manufacturing and agriculture and with few companies (there is one hotel in all of Tuvalu) – it is not easy to land a job. In addition, practically all the food people consume comes from other countries. Imports have more than doubled in the past decade.

At the same time, Tuvalu wants to keep up with modern social developments and is thus adopting a modern lifestyle. This means that many people drive cars and ride motorcycles, even though it is possible to walk or bicycle everywhere. In this way, they are contributing to carbon dioxide emissions. There are also no sustainable waste management systems, and rubbish is thrown both on the streets and into the sea. Due to the humid climate, everything made of sheet metal also

CHANGE  
SLIDE!

rusts away, so people have to buy new things often.

### **GOAL 3: GOOD HEALTH AND WELL-BEING**

Because of their new, modern lifestyle, Tuvaluans are increasingly suffering from “Western diseases” that were not here before. For example, more and more people are contracting diabetes and cardiovascular diseases. Alcohol abuse is another big problem in Tuvalu.

CHANGE  
SLIDE!

### **GOAL 5: GENDER EQUALITY.**

In spite of its modernisation process, Tuvalu is very traditional in terms of the opportunities and rights of men and women. There are big differences between men and women. The traditional role of women is to stay at home with the children. In Tuvalu, women may not go out after sunset and only men can go out to restaurants and bars. To be able to create a sustainable and inclusive society, the rights of women and girls are a central issue.

CHANGE  
SLIDE!

### **GOAL 4: QUALITY EDUCATION.**

Despite the big differences between men and women that generally prevail, all children are entitled to attend school in Tuvalu and nearly everyone can read and write, but many people travel to Fiji to attend school. A good education is needed in order to gain new knowledge and respond to the many challenges facing Tuvalu.

CHANGE  
SLIDE!

### **GOAL 13: CLIMATE ACTION AND GOAL 9: INDUSTRY, INNOVATION AND INFRASTRUCTURE.**

Knowledge is needed in order to combat climate change, build resilient infrastructure, promote industrialisation and foster new initiatives and methods...

CHANGE  
SLIDE!

### **GOAL 16: PEACE, JUSTICE AND STRONG INSTITUTIONS.**

...and in order to create sustainable structures that will make Tuvalu peaceful and inclusive. This is essential to create ecologically, socially and economically sustainable development for everyone, and to ensure that Tuvalu is still there – even in the future.

CHANGE  
SLIDE!

### **GOAL 17: PARTNERSHIPS FOR THE GOALS.**

Although Tuvalu is located far out in the Pacific Ocean, the country is not as isolated from the rest of the world today. Instead it is a participant in the global conversation about sustainable development. Because it risks disappearing under the sea, Tuvalu has put its name on the map.

## **References:**

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<http://www.global-greenhouse-warming.com/global-carbon-cycle.html>  
<https://www.un.org/sustainabledevelopment/sustainable-development-goals/>  
<https://chargedaffairs.org/tuvalu-countdown-to-drowning/>  
<https://www.youtube.com/watch?v=EZUunoZtfCO>

This is an adapted and updated international version of a Swedish-language article by Petra Hansson, Swedish International Centre of Education for Sustainable Development (SWEDESD), originally published in 2017.





### [3.] Game of Goals (25 minutes)

*The students work in up to eight groups with a “Game of Goals”, aimed at discussing the Global Goals and discovering how they fit together. The groups report to each other by posting their most important goal – for example by using adhesive putty – on a blackboard, whiteboard or wall. Then they explain why they feel that this particular goal is the most important. The groups rank the goals, first at the global level and then at local level. Finally, they formulate their own concrete proposals for action, primarily based on their work about the local level or on tips from the video. For cards, see Appendix 3. The playing field is in Appendix 2.*

There are a lot of goals – 17 of them – that the countries of the world have agreed to work towards.

GLOBAL LEVEL. You are the Secretary General of the United Nations, and your assignment is to rank the goals.

- (1) Select the three most important goals first.
- (2) Which of these is the most important of all?
- (3) Justify your selection of that particular goal.

LOCAL LEVEL. You have been the UN Secretary General, but if were to go home to your school and work with these goals, would their ranking look different?

Imagine that you are an advisor to your school principal. What would be the most important goals to work with at your own school? Choose ONE.

- (1) Select the three most important goals first.
- (2) Which of these is the most important of all?
- (3) Justify your selection of that particular goal.

#### **[4.] Bridge to the video and its focus on Goal 13 (7 minutes).**

*Transition from students' work with all 17 Global Goals to the goal that the video focuses on: Goal 13 (Climate action). Further connections to Nobel Prize-awarded achievements, with ICCP and Al Gore as examples.*

What issues related to sustainable development do you hear the most about (through television, newspapers and magazines, advertising or social media)?

*Hopefully the students will mention the climate change issue. Otherwise the teacher should steer the conversation in this direction.*

#### **AL GORE AND THE IPCC (PEACE, 2007)**

Former US Vice President Al Gore has travelled and lectured on climate change in many places around the world. Via mass media, he generated strong public interest in the climate change issue with his film *An Inconvenient Truth*. This documentary film tries to answer questions about global warming (the enhanced greenhouse effect). It helped to put climate change on the political agenda worldwide. Gore shared the Nobel Peace Prize with the United Nations Intergovernmental Panel on Climate Change (IPCC). Since 1988, the IPCC has compiled studies about nature and climate from thousands of researchers in more than 100 countries. In this way, we can see how humans have influenced the climate and propose ways of improving the situation. For more information, see: [https://www.nobelprize.org/nobel\\_prizes/peace/laureates/2007/](https://www.nobelprize.org/nobel_prizes/peace/laureates/2007/)

#### **[5.] Video (15 minutes)**

*The video focuses on the climate change issue and on issues connected to our lifestyle. It has three parts, including a description of the situation and analysis of the climate change issue today. The video closes on a hopeful note about what we can do to resolve the climate change issue in the future. You will find this video, entitled "The Future is Now" at: <https://bifrostonline.org/a-sustainable-future/>*

*While watching, figure out a concrete action you could carry out within one of the goals. Tip: Think about what goal you would like to improve at your school, or perhaps the video will give you another idea.*

#### **[6.] Conclusion (5 minutes)**

*The students should reflect on the video. The video is dramatic, and we need to tie together the programme after watching it.*

*It was a disturbing video but as we can see, there is hope for the future if all of us accept our share of responsibility.*

*INDIVIDUAL LEVEL. Before watching the video, you have discussed the issues at the global (UN) level and at the local (school) level. But which of these do you consider more important? What can you do to contribute to combating climate change, at school or individually? Using a post-it note, write down a concrete action you can take. Put the post-it note on the blackboard, whiteboard or wall.*



*Students formulate their own action proposals, primarily based on the results of their work with the local level, or on inspiration from the video. They write these down individually on post-it notes that they put up on display. If any of the students is passionate about one of the other 16 Global Goals, he or she may of course write down an action proposal aimed at achieving that other goal.*

# GLOBAL SUSTAINABLE DEVELOPMENT GOALS, OVERVIEW

*Effective in 2016, world leaders committed themselves to 17 Global Goals aimed at achieving three fantastic things during the next 15 years: abolishing extreme poverty, reducing inequalities and injustices in the world and solving the climate crisis. The Global Goals for Sustainable Development will enable us to achieve these things – in all countries, for all people. To make sure that the goals will work, everyone needs to know about them.*



## No poverty

Poverty covers more dimensions of sustainable development than merely the economic. Poverty also means a lack of freedom, power, influence, health, education and physical safety. Eradicating poverty is fundamental to enabling people to fully enjoy their human rights.



## Zero hunger

Access to sufficient and nutritious food is a human right that each state has an obligation to guarantee its citizens. Today, some 850 million people around the world live in hunger. Food security is dependent on efficient trade and markets, and also efficient infrastructure for transport and storage; it is promoted through gender-equal and equitable access to markets, research and innovation, information and adequate advisory services. Food waste and loss throughout the value chain is a major problem.



## Good health and well-being

Good health is fundamental to enabling people to achieve their full potential and contribute to the development of society. Achieving optimal health, including access to necessary health care, food, water, clean air, sanitation, hygiene and medicines, is a fundamental right. The global trend is that people are living longer, but support systems for elderly people are often lacking. The spread of globalisation also means an increased risk of spreading various types of health risks.



## Quality education

Education is a fundamental human right. An estimated 250 million children still cannot read or write when they begin grade four. Some 774 million people around the world are illiterate, two thirds of whom are women. Inclusive quality education for all is one of the most important cornerstones of prosperity, health and gender equality in every society.



## Gender equality

Gender equality is a goal in itself and a prerequisite for sustainable and peaceful development. It is achieved when women, men, girls and boys have equal rights, conditions and opportunities, and the power to shape their own lives and contribute to the development of society. It is a matter of equitable distribution of power, influence and resources in society. Poverty decreases and economic productivity and growth increase when women participate in the economy and the labour market, and have access to resources and functioning markets.



### Clean water and sanitation

Water is essential for all life on earth, and therefore key to sustainable development. Untreated industrial and household wastewater leads to polluted water and creates unhealthy environments that particularly affect people living in poverty. Water is also essential for the world's production of food and energy, and shortage of water can therefore be a cause of conflict. The effects of climate change are clearly evident through the change in access to water. Many women and girls risk their personal safety when they are forced to go to isolated areas to relieve themselves or fetch water.



### Affordable and clean energy

Global access to modern and renewable energy and clean fuel is fundamental to meeting several of the challenges currently facing the world, including poverty, food security, climate change, clean water, health and inclusive economic growth. A large proportion of the increased greenhouse gas emissions come from the way we extract, convert and use fossil energy. Fossil energy makes up almost 80 per cent of the total global energy supply. The lack of electricity and healthy and environmentally sustainable fuel is a major challenge to combating poverty.



### Decent work and economic growth

More than half of the world's workers are in insecure jobs, often caught in a vicious circle of low-productive occupations with poor pay, and limited access to both education and social insurance. This applies more to women than to men. Good conditions for private enterprise and entrepreneurship are one of the prerequisites for growth that society as a whole takes part in, and for achieving the goal of eradicating extreme poverty by 2030.



### Industry, innovation and infrastructure

Over half of the world's population live in urban areas. By 2050, this proportion is expected to have risen to 70 per cent. Policies that boost production capacity, productivity and productive employment, promote sustainable industrial development and public access to economically affordable, reliable, sustainable and modern energy services as well as sustainable transport systems – and that provide resilient, high-quality infrastructure – will be increasingly important in an urbanised world.



### Reduced inequalities

Even if many countries have experienced positive economic development and reduced poverty, gaps between individuals and groups have widened. States have the main responsibility for promoting equality in society, since inequality stems from structural conditions. An equal society is based on the principle of the equal rights of all people regardless of gender, sexual orientation, ethnicity, religion or belief, disability or origin, as a basis for an equitable distribution of resources, and economic and political influence in society. The issue of equality is linked to most of the other global goals.



### Sustainable cities and communities

Over half of the world's population live in urban areas. By 2050, this proportion is expected to have risen to 70 per cent. Cities often take the lead when it comes to development, and are hubs of innovation and new ideas. Growing cities can create new opportunities for economic growth but also contribute to increased social disparities and strains on ecosystems. A rights perspective and the right to housing are important challenges. Today, one billion people live in slum areas.



### Responsible consumption and production

The transition to sustainable consumption and production of goods and services is necessary to reduce the negative impact on the climate and the environment, and on people's health. Sustainable consumption and production involve using resources efficiently, taking account of ecosystem services that are vital to making a living, and reducing the impact of dangerous chemicals. This not only means environmental benefits but also social and economic benefits such as increased employment and improved health, and consequently reduced poverty.



### Climate action

Climate change is one of the greatest challenges of our time. A major proportion of the increased greenhouse gas emissions in the atmosphere come from the way we extract, convert and use fossil energy. As a result of the increased emissions, we risk moving towards an average global warming that exceeds 2 degrees Celsius, which would have serious consequences for ecosystems, ocean acidification, human safety, food production, access to water, health and an increased risk of weather-related natural disasters. Climate impact must be limited to create the conditions for poverty reduction and long-term sustainable development.



### Life below water

To ensure fish stocks that are sustainable in the long term, fishing should be based on achieving the maximum sustainable yield, taking account of special conditions in specific regions and ocean areas. Aquaculture plays a key role and is one component in ensuring food security, provided that this is done in a sustainable manner. Protection and restoration of coastal and marine areas are key measures to preserve biodiversity and fishery resources, and also to strengthen resilience to climate change. KL



### Life on land

Biodiversity is a vital foundation for Earth's life-sustaining systems and forms the basis of our current and future welfare, as is stated in the Convention on Biological Diversity. Most often, it is people living in poverty, particularly girls and women, who are most vulnerable to the challenges of ecosystem services, such as drinking water, water purification and regulation, erosion protection and fertility. Climate change has a negative impact on natural resources and ecosystem services.



### Peace, justice and strong institutions

Peaceful societies and freedom from violence are both a goal and a means of sustainable development. Everyone is equal before the law and must have equal access to justice and the opportunity to exert influence and demand accountability from decision-makers. Good governance and the rule of law are fundamental goals and means for development. The terms 'democracy' and 'human rights' are not explicitly expressed in Goal 16. They are, however, clearly stated in the political declaration of the 2030 Agenda.



### Partnerships for the goals

Robust global engagement will be needed to support implementation of the Agenda. The Agenda is characterised by a multi-stakeholder perspective, which will also be necessary during its implementation. Governments, the private sector, civil society as a whole, the UN system and other actors must work together to accomplish what we set out to achieve through the 2030 Agenda, based on a spirit of global solidarity.



## NOBEL PRIZE-AWARDED ACHIEVEMENTS (in-depth)

*The basic idea is to provide at least one example from each Nobel Prize category, without regard to whether all Global Goals are covered or not. However, one idea is to highlight women and another is to select prize-awarded achievements that are suitable for Grades 7-9.*



### ISAMU AKASAKI, HIROSHI AMANO AND SHUJI NAKAMURA<sup>1</sup>

The 2014 Nobel Prize in Physics

*“for the invention of efficient blue light-emitting diodes, which has enabled bright and energy-saving white light sources”*

The Laureates invented a new energy-efficient and environmentally friendly light source – the blue light-emitting diode (LED). In the spirit of Alfred Nobel, the Prize rewards an invention of the greatest benefit to humankind; by using blue LEDs, white light can be created in a new way. With the advent of LED lamps, we now have more long-lasting and more efficient alternatives to older light sources: incandescent light bulbs and fluorescent lamps. White LED lamps are energy-efficient, long-lasting and emit a bright white light. Moreover, unlike fluorescent lamps, they do not contain mercury. Mercury is environmentally hazardous if it is released. Although red and green light-emitting diodes are almost half a century old, blue light was needed to revolutionise lighting technology. Only the triad of red, green and blue can produce the white light that illuminates the world for us.

A light-emitting diode (LED) consists of a number of layered semiconductor materials. In the LED, electricity is directly converted into light particles, photons, leading to efficiency gains compared to other light sources where most of the electricity is converted into heat and only a small amount into light. The new LEDs thus require less energy in order to emit light than older light sources.

*The LED lamp also holds great promise when it comes to the possibility of increasing the quality of life for the more than 1.5 billion people who currently lack access to electricity grids, as the low power requirements imply that the lamp can be powered by cheap local solar power. Moreover, polluted water can be sterilised using ultraviolet LEDs, a subsequent elaboration of the blue LED.*

(6) CLEAN WATER AND SANITATION

(7) AFFORDABLE AND CLEAN ENERGY

(9) INDUSTRY, INNOVATION AND INFRASTRUCTURE

(11) SUSTAINABLE CITIES AND COMMUNITIES

(12) RESPONSIBLE PRODUCTION AND CONSUMPTION

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1. <https://www.nobelprize.org/uploads/2018/06/popular-physicsprize2014.pdf>



MARIO MOLINA, PAUL J. CRUTZEN  
AND F. SHERWOOD ROWLAND<sup>2</sup>

The 1995 Nobel Prize in Chemistry

*“for their work in atmospheric chemistry,  
particularly concerning the formation and decomposition of ozone”*

The atmosphere surrounding the earth contains small quantities of ozone – a gas with molecules consisting of three oxygen atoms ( $O_3$ ). Ozone, together with ordinary molecular oxygen ( $O_2$ ), serves as a filter for solar radiation and prevents dangerous ultraviolet (UV) radiation from reaching the surface. The ozone layer of the atmosphere (in the stratosphere, at 10–50 km altitude) protects all living organisms on earth from harmful UV light. Humans risk contracting skin cancer, and photosynthesis in plants is disrupted by UV light. It also harms algae in the sea, which are at the bottom of food chains. It is therefore of the greatest importance to understand the processes that regulate the atmosphere’s ozone content.’

Ozone can also form at just above ground level, and then it is instead dangerous to living organisms. Ground-level ozone is formed when hydrocarbons encounter nitrogen oxides and the sun is shining. This transforms atmospheric oxygen molecules into ozone molecules, often due to air pollution from highways and other sources. Ground-level ozone destroys the chlorophyll in plants (interrupting photosynthesis) and irritates the respiratory tract in humans. Ozone is formed in the atmosphere through a series of reactions with oxygen molecules. An oxygen molecule (two attached oxygen atoms,  $O_2$ ) is split by high-altitude UV radiation, enabling the individual atoms to combine with whole oxygen molecules to form ozone (three attached oxygen atoms,  $O_3$ ). It requires a lot of energy to form ozone. This is why it happens high up in the atmosphere, where UV light is strong. Normally the amount of ozone being formed is the same as the amount that decomposes, so that there is a uniform layer of ozone all the time.

Paul Crutzen, Mario Molina and Sherwood Rowland all made pioneering contributions to explaining how ozone is formed and decomposes through chemical processes in the atmosphere. Most importantly, in this way they showed how sensitive the ozone layer is to the influence of human-caused emissions of certain compounds.

In 1974 two of the Laureates (Molina and Rowland) described in the journal *Nature* how the ozone layer was threatened by chlorofluorocarbon (CFC) gases – also called freons – used in spray cans, refrigerators and the production of plastic foam. They realised that the chemically inert CFC gases eventually entered the atmosphere and were transported up to the ozone layer, a process that can take many years. There, these gases encounter such intensive UV light that they separated into their constituents, one of which is chlorine. This chlorine can react with ozone, decomposing it. Bromine atoms in some of these gases are even more efficient in decomposing ozone than chlorine.

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2. <https://www.nobelprize.org/prizes/chemistry/1995/press-release/>  
<https://www.britannica.com/science/ozone-depletion>



Restrictions on the use of freons were introduced. But the real shock did not come until 1985. A drastic depletion of the ozone layer over the Antarctic region was discovered: the “ozone hole”. This depletion exceeded earlier calculations of the CFC effect. Debate among researchers now intensified. Was this a natural climatic variation, or was it a chemical decomposition brought about by us humans?

Thanks to pioneering research by many researchers – among them Crutzen, Molina and Rowland – the picture became clearer. This depletion was mainly due to chemical reactions between the ozone layer and chlorine and bromine from industrially manufactured CFC gases.

Ozone-decomposing chemical reactions are greatly reinforced by the presence of cloud particles, which explains why the “ozone hole” formed above Antarctica.

A protocol on the protection of the earth’s ozone layer was negotiated under the auspices of the United Nations and was signed in Montreal, Canada in 1987. Under the latest tightening of the Montreal Protocol, the most dangerous gases were totally banned from 1996 (developing countries were given a few more years to introduce substitutes that do not harm the ozone layer). Since it takes some time for ozone-destroying gases to reach the ozone layer, we must expect the depletion – not only above Antarctica but also over parts of the Northern Hemisphere – to worsen for some years to come. Assuming general compliance with the prohibitions, the ozone layer should gradually begin to heal during the 21st century, but it will take at least 100 years before it has fully recovered.

(3) GOOD HEALTH AND WELL-BEEING

(13) CLIMATE ACTION

(13) LIFE ON LAND



YOUYOU TU<sup>3</sup>

The 2015 Nobel Prize in Physiology or Medicine

*“for her discoveries concerning a novel therapy against malaria”*

Diseases caused by parasites have plagued humankind for millennia and constitute a major global health problem. In particular, parasitic diseases affect the world’s poorest populations and represent a huge barrier to improving human health and well-being.

Youyou Tu discovered Artemisinin, a drug that has significantly reduced the mortality rates for patients suffering from malaria. Her discoveries have provided humankind with powerful new means to combat this debilitating disease. The consequences in terms of reduced suffering and improved human health are immeasurable.

Malaria is a mosquito-borne disease caused by single-cell parasites, which invade red blood cells. The infection leads to fever, and in severe cases damage to

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3. <https://www.nobelprize.org/uploads/2018/06/press-29.pdf>

organs that can result in death. More than 3.4 billion people, especially in poor regions, are at risk of contracting malaria, and each year the disease claims more than 450,000 lives, predominantly among children.

Youyou Tu studied ancient herbal medicine remedies to see whether they might provide novel malaria therapies. She finally succeeded in developing a method of purification to extract the active component from *Artemisia annua*. She was later able to show that this component, now called Artemisinin, was highly effective in killing the malaria parasite, both in animals and in humans.

Artemisinin represents a new class of anti-malarial agents that are unique because they kill the malaria parasite at an early stage of its life cycle, which explains its unprecedented potency in the treatment of severe malaria. Other earlier drugs instead killed the mosquito that spreads the parasite. The discovery of Artemisinin has revolutionised the way we can treat malaria today.

Since Artemisinin came into use, total mortality from malaria has fallen by more than 20 per cent, and in children by more than 30 per cent. In Africa alone, this means that more than 100,000 lives are saved each year.

(1) BO POVERTY

(3) HEALTH AND WELL-BEING



#### SVETLANA ALEKSIJEVITJ<sup>4</sup>

The 2015 Nobel Prize in Literature

*“for her polyphonic writings, a monument to suffering and courage in our times”*

Alexievich was the 14th woman to be awarded the Literature Prize and the 48th woman among all Nobel Laureates. She was the sixth Laureate in Literature with Russian as her original language.

Alexievich calls her books “documentary novels” and comments: “I gather material like a journalist, but I work with the material like a writer.”

Her books can be regarded as examples of “witness literature” (a concept coined by Nobel Laureate Elie Wiesel in the 1970s). Among other Nobel Laureates that are usually included in this literary concept are Imre Kertész and Herta Müller.

Alexievich was a refugee writer in Sweden. She lived in Gothenburg during 2006–2008 and began contributing to the newspaper *GöteborgsPosten*. Today she lives in Minsk, Belarus.

Her prize citation is relatively short but interesting. “Polyphony” is a concept that showed up earlier, in the 2004 prize citation for Elfriede Jelinek, expressed at that time as her “flow of voices and counter-voices”.

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4. Text by Ebba Holmberg, February 2017.

As for the polyphony in her writings and her literary genre, Alexievich herself has said:

*I tried this and that and finally I chose a genre where human voices speak for themselves. Real people speak in my books about the main events of the age such as the war, the Chernobyl disaster, and the downfall of a great empire. Together they record verbally the history of the country, their common history, while each person puts into words the story of his/her own life.*

*(. . .)*

*But I don't just record a dry history of events and facts, I'm writing a history of human feelings. What people thought, understood and remembered during the event. What they believed in or mistrusted, what illusions, hopes and fears they experienced. This is impossible to imagine or invent, at any rate in such multitude of real details.*

Her best-known book is *The Unwomanly Face of War*, which was based on hundreds of interviews (thousands of hours of recorded material) with some of the nearly one million women who belonged to the Red Army and fought against Germany in the Second World War.

They ranged from nurses to snipers, and their stories of life and daily events during the war provides a whole new perspective on the Second World War. One recurring theme is what it was like being part of the Red Army as a woman, where everything was adapted to men and where – due to expectations about women – they received no recognition once the war was over, while male soldiers got medals and honours. The women who fought in the Red Army were viewed as suspect and morally dubious.

(5) GENDER EQUALITY

(10) REDUCED INEQUALITIES

(16) PEACE, JUSTICE AND STRONG INSTITUTIONS



## MALALA YOUSAFZAI<sup>5</sup>

Nobels fredspris 2014

*»for their struggle against the suppression of children and young people and for the right of all children to education«*

Malala Yousafzai shared the Peace Prize with a children's rights activist from India. Her own activism has centred on the right of girls to education. She grew up in Pakistan and fought for the rights of girls to attend school in her home district, where the Taliban were trying to enforce a ban on schooling for girls. In 2012, she was shot by a Taliban gunman and seriously wounded. When she gave a speech at United Nations headquarters in 2013, it was the first time she spoke publicly after recovering from her injuries. Her words "one child, one teacher, one book, one pen can change the world" have subsequently been cited in many other contexts.

She was only 17 years old when she received the Nobel Peace Prize, making her the youngest Nobel Laureate ever. When she got the news, she was in school. She said then that she wanted to wait until the end of the school day before commenting on the prize.

(4) QUALITY EDUCATION

(5) GENDER EQUALITY

(10) REDUCED INEQUALITIES

(16) PEACE, JUSTICE AND STRONG INSTITUTIONS



## ELINOR OSTROM<sup>6</sup>

The 2009 Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel

*"for her analysis of economic governance, especially the commons"*

Many natural resources are managed by multiple users as common property. Ostrom studied how our common resources should best be utilised. She carried out some field work herself, but also analysed information from a diverse set of sources about the governance of numerous resource pools throughout the world. By systematically comparing successful and failed systems, she was able to draw general conclusions. Experience from the commons is important to ensure that we do not destroy our natural environment to prevent our resources from collapsing.

Ostrom discovered that common property is often surprisingly well managed. One crucial factor is that the users themselves participate both in setting the rules and in ensuring compliance with them. But she also concluded that

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5. <https://www.nobelprize.org/prizes/peace/2014/yousafzai/facts/>

6. [https://6702d.https.cdn.softlayer.net/assets/globalassets-priser-ekonomi-2009-pop\\_ek\\_en\\_09.pdf](https://6702d.https.cdn.softlayer.net/assets/globalassets-priser-ekonomi-2009-pop_ek_en_09.pdf)

small-scale, traditional practices are no guarantee that the management of common resources will be successful.

One successful story is in Nepal, where locally managed irrigation systems have successfully allocated water between users for a long time. However, the dams have often been primitive and small: built from stone, mud and wood. In several places the Nepalese government, with assistance from foreign donors, has therefore built modern dams of concrete and steel. Despite flawless engineering, many of these projects have ended in failure. The reason is that durable dams require less maintenance, reducing the need for cooperation among users. This severed the ties between different users, and head-end users could extract a disproportionate share of the water without risking punishment from tail-end users. As a result, crop yield was frequently better in areas irrigated from primitive dams than around the modern dams.

Ostrom's message is that common property is usually well managed, thanks to rules that have evolved over a long period of time but that are not very evident to outsiders.

- (8) DECANT WORK AND ECONOMIC GROWTH
- (12) RESPONSIBLE CONSUMPTION AND PRODUCTION
- (15) LIFE ON LAND
- (16) PEACE, JUSTICE AND STRONG INSTITUTIONS



## AL GORE AND THE IPCC

The 2007 Nobel Peace Prize

*“for their efforts to build up and disseminate greater knowledge about man-made climate change, and to lay the foundations for the measures that are needed to counter-act such change”*

Former US Vice President Al Gore has travelled and lectured on climate change in many places around the world. Via mass media he has generated strong public interest in the climate change issue with his film *An Inconvenient Truth*. This documentary film tries to answer questions about global warming (the enhanced greenhouse effect). It helped put climate change on the political agenda worldwide and won an Oscar for best feature-length documentary and best original song at the 2007 Academy Awards show. Gore shared the Peace Prize with the United Nations Intergovernmental Panel on Climate Change (IPCC). Since 1988, the IPCC has compiled studies about nature and climate from thousands of researchers in more than 100 countries. In this way, we can see how humans have influenced the climate and propose ways of improving the situation.

The greenhouse effect is a natural and important part of the earth's climate. The sun's rays enter the atmosphere and warm the earth, which in turn radiates heat that largely disappears out into space, but a small proportion is reflected back towards the earth due to atmospheric greenhouse gases. The thermal radiation



that thus returns to the earth further contributes to heating it up. This is the natural greenhouse effect and is necessary to keep the earth at comfortable temperatures. The greenhouse gases act like the glass that encloses a greenhouse. Sunlight comes in, but heat does not go out.

Because we burn fossil fuels such as coal, natural gas and oil, carbon dioxide emissions have increased. This is the largest cause of the enhanced greenhouse effect. The worst greenhouse gas is carbon dioxide, because there is so much of it in the atmosphere. (There are small quantities of atmospheric methane, partly due to belching cows and rice fields, but this is not as hazardous). As the quantity of atmospheric greenhouse gases increases, more thermal radiation from the Earth is being prevented from disappearing out into space. Because of the enhanced greenhouse effect, the average global temperature has increased in recent years and is expected to continue rising unless we change our behaviour. This increase in temperature is what we call global warming, whose consequences will be climate change that will adversely affect the entire earth.

Gore says that we can reduce climate change, but all countries must help. This is an issue that we must resolve together, globally

(13) CLIMATE ACTIONS

(14) LIFE BELOW WATER

(15) LIFE ON LAND



## NOBEL PRIZE-AWARDED ACHIEVEMENTS (abbreviated texts)

*The basic idea is to provide at least one example from each Nobel Prize category, without regard to whether all Global Goals are covered or not. However, one idea is to highlight women and another is to select prize-awarded achievements that are suitable for Grades 7-9.*



### **ISAMU AKASAKI, HIROSHI AMANO AND SHUJI NAKAMURA (FYSIK, 2014)**

*“for the invention of efficient blue light-emitting diodes, which has enabled bright and energy-saving white light sources”*

The Laureates invented a new energy-efficient and environmentally friendly light source – the blue light-emitting diode (LED). Using blue LEDs, it is now possible to create LED lamps that consume little energy, are long-lasting and emit a bright white light. Moreover, unlike fluorescent lamps, they do not contain mercury.

The LED lamp holds great promise when it comes to the possibility of increasing the quality of life for the more than 1.5 billion people who currently lack access to electricity grids; their low power requirements imply that such a lamp can be powered by cheap local solar power.

(6) CLEAN WATER AND SANITATION

(7) AFFORDABLE AND CLEAN ENERGY

(9) INDUSTRY, INNOVATION AND INFRASTRUCTURE

(11) SUSTAINABLE CITIES AND COMMUNITIES

(12) RESPONSIBLE PRODUCTION AND CONSUMPTION



### **MARIO MOLINA, PAUL J. CRUTZEN AND F. SHERWOOD ROWLAND (KEMI, 1995)**

*“for their work in atmospheric chemistry, particularly concerning the formation and decomposition of ozone”*

The ozone layer serves as a filter for solar radiation. It protects all living organisms on earth from harmful ultraviolet (UV) light. Normally the amount of ozone being formed is the same as the amount that decomposes, so that there is a uniform layer of ozone all the time. The Laureates showed how sensitive the ozone layer is to the influence of human-caused emissions of certain compounds, especially freons. Freons used to be found in spray cans and refrigerators. Today these hazardous gases are prohibited and ozone depletion can slowly begin healing, but this will take a long time.

(13) CLIMATE ACTIONS



### **YOUYOU TU (PHYSIOLOGY OR MEDICINE, 2015)**

*“for her discoveries concerning a novel therapy against malaria”*

Malaria is a parasitic disease that has an especially large impact on the poorest human populations and constitutes a global health problem. Malaria is a mosquito-borne disease. Youyou Tu studied ancient herbal medicine remedies to see whether they might provide novel malaria therapies. She found that a plant called sweet wormwood contained a substance that was highly effective in killing the malaria parasite. This discovery led to a reduction in human suffering and to improved global health, while greatly lowering malaria deaths

(3) GOOD HEALTH AND WELL-BEING



### **SVETLANA ALEXIEVICH (LITERATURE, 2015)**

*“for her polyphonic writings, a monument to suffering and courage in our times”*

Alexievich calls her books “documentary novels” and comments: “I gather material like a journalist, but I work with the material like a writer.” She gives a voice to people who would otherwise never be entitled to express themselves. She writes about the history of Soviet people.

Her best-known book is *The Unwomanly Face of War*, which was based on hundreds of interviews (thousands of hours of recorded material) with some of the nearly one million women who were in the Red Army and fought against Germany in the Second World War.

They ranged from nurses to snipers, and their stories of life and daily events during the war provides a whole new perspective on the Second World War. One recurring theme is what it was like being part of the Red Army as a woman, where everything was adapted to men and where – due to expectations about women – they received no recognition once the war was over, while male soldiers got medals and honours. The women who fought in the Red Army were viewed as suspect and morally dubious.

(5) GENDER EQUALITY

(10) REDUCED INEQUALITIES

(16) PEACE, JUSTICE AND STRONG INSTITUTIONS



### **MALALA YOUSAFZAI (PEACE, 2014)**

*“for their struggle against the suppression of children and young people and for the right of all children to education”*

Malala Yousafzai grew up in Pakistan and fought for the rights of girls to attend school. The Taliban disapproved of her campaign. In 2012 she was shot by a Taliban gunman and seriously wounded.

“One child, one teacher, one book, one pen can change the world”, she said in her first speech after recovering, at UN headquarters in 2013.

She was only 17 years old when she received the Nobel Peace Prize, making her the youngest Nobel Laureate ever. When she got the news, she was in school. She said then that she wanted to wait until the end of the school day before commenting on the prize.

((4) QUALITY EDUCATION

(5) GENDER EQUALITY

(10) REDUCED INEQUALITIES

(16) PEACE, JUSTICE AND STRONG INSTITUTIONS



#### **AL GORE & KLIMATPANELEN (PEACE, 2007)**

*»for their efforts to build up and disseminate greater knowledge about man-made climate change, and to lay the foundations for the measures that are needed to counteract such change«*

Former US Vice President Al Gore has travelled and lectured on climate change in many places around the world. Via mass media he has generated strong public interest in the climate change issue with his film *An Inconvenient Truth*. This documentary film tries to answer questions about global warming (the enhanced greenhouse effect). It helped put climate change on the political agenda worldwide. Gore shared the Peace Prize with the United Nations Intergovernmental Panel on Climate Change (IPCC). Since 1988, the IPCC has compiled studies about nature and climate from thousands of researchers in more than 100 countries. In this way, we can see how humans have influenced the climate and propose ways of improving the situation.

(13) CLIMATE ACTIONS



#### **ELINOR OSTROM ((ECONOMIC SCIENCES, 2009)**

*“for her analysis of economic governance, especially the commons”*

Ostrom studied how our common resources should best be utilised. Her research is important to ensure that we do not destroy our natural environment to prevent our resources from collapsing.

Ostrom discovered that common property is often surprisingly well managed. One crucial factor is that the users themselves participate both in setting the rules and in ensuring compliance with them.

(15) LIFE ON LAND

(16) PEACE, JUSTICE AND STRONG INSTITUTIONS



N<sup>o</sup> 73 År 1897 den 5 Februari uppvist vid vittnesförhör inför  
 Stockholms Rådshofveräts Sjette Afdelning; betyggar  
 Lösen En krona  
 aut. & prot. *Testament* *Jacob Anders.*

Jag undertecknad Alfred Bernhard  
 Nobel förklarar härmed efter mycket  
 betänkande min yttersta vilja i afseende  
 å den egendom jag vid min död kan ef-  
 terlemnna vara följande:

Minna Brorssöner Hjalmar och Ludvig  
 Nobel, söner af min Broder Robert Nobel, erhålla  
 hvardera en Summa af Två Hundra Tusen Kronor;

Min Brorsson Emanuel Nobel erhåller Tre  
 Hundra Tusen och min Brorsdatter Nina Nobel  
 Ett Hundra Tusen Kronor;

Min Broder Robert Nobels döttrar Ingelborg  
 och Tyra erhålla hvardera Ett Hundra Tusen Kronor;

Fröken Olga Boettger, för närvarande boende  
 hos Fru Brand, 10 Rue St Florentin i Paris, erhåller  
 Ett Hundra Tusen Francs;

Fru Sofia Kapy von Kapivar, hvars adress  
 är känd af Anglo-Oesterreichische Bank i Wien  
 är berättigad till en lifränta af 6000 Floriner O.W.  
 som betalas henne af Sagde Bank och hvarföre sig  
 i denna Bank deponerat 150,000 fl. Ungerska Statopapper.

Herr Alarik Liedbeck, boende 26 Sturegatan,  
 Stockholm, erhåller Ett Hundra Tusen Kronor

Fröken Elise Antun, boende 32 Rue de Lubeck  
 Paris, är berättigad till en lifränta af Två Tusen  
 Fem Hundra Francs. Dessutom inrättas hos mig  
 för närvarande Tyra's åtta Tusen Francs henne till  
 hörigt Kapital som äges att till henne återbetalas;

Herr Alfred Hammond, Waterford, Texas,  
 United States, erhåller Tio Tusen Dollars;

Fröknarna Emmy Winkelmann och Marie Win-

54. År 1897 den 30 Septembris, i hvarföre jag undertecknad Alfred Bernhard Nobel förklarar härmed efter mycket betänkande min yttersta vilja i afseende å den egendom jag vid min död kan efterlemnna vara följande:

Ströman Åger.



## APPENDIX 1: THE WILL OF ALFRED NOBEL

On November 27, 1895, Alfred Nobel signed his third and last will at the Swedish-Norwegian Club in Paris. When it was opened and read after his death, the will caused a lot of controversy both in Sweden and internationally, since Nobel had left much of his wealth for the establishment of a prize. His family opposed the establishment of the Nobel Prize, and the prize awardees he named refused to do what he had requested in his will. After years of negotiations, the first Nobel Prize was awarded in 1901.

In this excerpt from the will, Alfred Nobel dictates that his entire remaining estate after specified bequests should be used to endow “prizes to those who, during the preceding year, have conferred the greatest benefit to humankind”.

“All of my remaining realisable assets are to be disbursed as follows: the capital, converted to safe securities by my executors, is to constitute a fund, the interest on which is to be distributed annually as prizes to those who, during the preceding year, have conferred the greatest benefit to humankind. The interest is to be divided into five equal parts and distributed as follows: one part to the person who made the most important discovery or invention in the field of physics; one part to the person who made the most important chemical discovery or improvement; one part to the person who made the most important discovery within the domain of physiology or medicine; one part to the person who, in the field of literature, produced the most outstanding work in an idealistic direction; and one part to the person who has done the most or best to advance fellowship among nations, the abolition or reduction of standing armies, and the establishment and promotion of peace congresses. The prizes for physics and chemistry are to be awarded by the Swedish Academy of Sciences; that for physiological or medical achievements by the Karolinska Institute in Stockholm; that for literature by the Academy in Stockholm; and that for champions of peace by a committee of five persons to be selected by the Norwegian Storting. It is my express wish that when awarding the prizes, no consideration be given to nationality, but that the prize be awarded to the worthiest person, whether or not they are Scandinavian.”





*Print out or copy in A3 format and give one to each group.*



APPENDIX 3: PLAYING CARDS (REDUCED-SIZE)

*Print out or copy in A3 format and cut out one set for each group.*



## APPENDIX 4: EXCERPTS FROM SWEDEN'S SCHOOL CURRICULUM

### Curriculum. Grades 7–9

#### The tasks of the school

An environmental perspective provides students with opportunities not only to take responsibility for the environment in areas where they themselves can exercise direct influence, but also to form a personal position with respect to overarching and global environmental issues. Teaching should illuminate how the functions of society and our ways of living and working can best be adapted to create sustainable development.

#### Knowledge

##### Goals

The school is responsible for ensuring that each pupil on completing compulsory school has obtained knowledge about the prerequisites for a good environment and sustainable development, and has obtained knowledge about and an understanding of the importance of the individual's own lifestyle and its impact on health, the environment and society.

### BIOLOGY

#### Aim, biology

Teaching should give pupils opportunities to use and develop knowledge and tools for expressing their own arguments and examining those of others in contexts where knowledge of biology is of importance. As a result, pupils should be given the preconditions to manage practical, ethical and aesthetic situations involving health, use of natural resources and ecological sustainability.

Teaching in biology should essentially give pupils the opportunities to develop their ability to use knowledge of biology to examine information, communicate and take a view on questions concerning health, natural resource use and ecological sustainability.

#### Core content

##### Nature and society

- Impact of people on nature, locally and globally. Opportunities for consumers and citizens of society to contribute to sustainable development.
- Current societal issues involving biology

## **PHYSICS**

### Core content, physics

Physics in nature and society

- Current societal issues involving physics.

## **CHEMISTRY**

### Core content, chemistry

Chemistry in everyday life and society

- People's use of energy and natural resources, locally and globally, as well as what this means in terms of sustainable development.

## **GEOGRAPHY**

Aim, geography

Teaching in geography should essentially give pupils the opportunities to develop their ability to assess solutions to different environmental and development issues based on considerations concerning ethics and sustainable development.

### Core content, geography

Living environments

- The Earth's climatic and vegetation zones and also the ways in which climate affects people's living conditions.
- Climate change, different explanations for this, and the consequences of changes on people, society and the environment in different parts of the world.

## **CIVICS**

Aim, civics

Through teaching, pupils are given the opportunity based on their personal experiences and current events to express and consider their views in relation to others who hold different views. As a result, pupils should be encouraged to get involved and participate in an open exchange of views on societal issues.

Teaching in civics should essentially give pupils the opportunities to develop their ability to:

- analyse and critically examine local, national and global societal issues from different perspectives
- express and assess different standpoints in e.g. current societal issues and arguments based on facts, values and different perspectives.

### Core content, civics

Rights and the judicial system

- Democratic freedoms and legal rights, as well as obligations for citizens in democratic societies. Ethical and democratic dilemmas linked to democratic rights and obligations.

Decision-making and political ideas

- Opportunities for individuals and groups to affect decisions and development of society, and also how decisions can be affected within the framework of the democratic process.

## **RELIGION**

### **Aim, religion**

Teaching should encourage pupils to reflect over various issues concerning life, their identity and their ethical attitudes. In this way, teaching should create the conditions for pupils to develop a personal attitude to life and an understanding of how they and others are thinking and living.

### Core content, religion

Ethics

- Ethical concepts which can be linked to questions concerning sustainable development, human rights and democratic values, such as freedom and responsibility.

## **Curriculum. Tasks of the upper secondary school**

Ethical perspectives are of importance for many of the issues that are taken up in education. For this reason education in different subjects should cover these perspectives and provide students with a foundation for and support their ability to develop personal views.

Environmental perspectives in education should provide students with insights so that they can not only contribute to preventing harmful environmental effects, but also develop a personal approach to overarching, global environmental issues. Education should illuminate how the functions of society and our ways of living and working can best be adapted to create sustainable development.

Knowledge

Aims

It is the responsibility of the school that all individual students can observe and analyse the interaction between people in their surroundings from the perspective of sustainable development.

## **BIOLOGY**

Aim, biology

Teaching should give students opportunities to use and develop knowledge and tools for expressing their own arguments and examining those of others in contexts where knowledge of biology is of importance. As a result, pupils should be given the preconditions to manage practical, ethical and aesthetic situations involving health, use of natural resources and ecological sustainability.



Teaching in biology should essentially give students the opportunities to develop their ability to use knowledge of biology to examine information, communicate and take a view on questions concerning health, natural resource use and ecological sustainability.

#### Core content, Biology 1

Ecologically sustainable development, locally and globally, as well as different ways of contributing to this.

### **PHYSICS**

Aim, physics

Teaching should help students to develop knowledge about the various applications of physics in such fields as technology, medicine and sustainable development, and thus about the role of physics in society.

Teaching should also help students, from a scientific point of view, to participate in public discourse and discuss ethical issues and positions.

#### Core content, Physics 1

Positions on societal issues based on physical explanation models, for example sustainable development issues.

### **CHEMISTRY**

Aim, chemistry

Teaching should also help students, from a scientific point of view, to participate in public discourse and discuss ethical issues and positions.

#### Core content, Chemistry 1

Positions on societal issues based on chemical models, for example sustainable development issues.

### **GEOGRAPHY**

Aim, geography

Teaching should enable students to develop knowledge of the earth's varied living environments, their evolution, changeability, resources and vulnerabilities, as well as about the potential and problems of making sustainable development possible. Teaching in the subject of geography should equip students to develop an ability to analyse conflicts of interests connected to inherent natural risks and human activities, as well as how conflicts of interest affect the earth's living environments and human living conditions from a sustainable development perspective.

#### Core content, Geography 1

The global playing field and local development. Relationships between population growth, access to resources, resource use and conflicts of interest. Ethical

issues connected to competition for the earth's resources, alternative and potential paths to social justice and sustainable development.

## **CIVICS**

Aim, civics

Teaching in the subject of civics should aim at broadening, deepening and improving the students' knowledge of human living conditions, based on various societal issues. Political, social and economic ties link together people in different societies all over the world today.

Students should be given the opportunity to develop an understanding of issues related to working life, resources and sustainable development.

### Core content, Civics 1b

Opportunities for citizens to influence political decisions at different levels. The allocation of power and potential influence in various systems and at different levels, based on fundamental democratic models.

## APPENDIX 5: BACKGROUND OF THE GLOBAL GOALS

### THE PATH TO THE GLOBAL GOALS AND AGENDA 2030

1972 – The Stockholm Declaration was issued by the first United Nations conference on the environment, held in Stockholm with 114 countries represented. It provided a foundation for international environmental law.

1987 The Brundtland Commission or World Commission on Environment and Development published the report *Our Common Future* on behalf of the UN. The report explained the relationship between economic development and environmental destruction and united the world's environmental movements behind the concept of “sustainable development”.

1992 Rio de Janeiro – Agenda 21. An action programme adopted at the United Nations Conference on Environment and Development. The programme describes how the task of combating degradation of nature and the environment, poverty and lack of democracy should be pursued in order to ensure sustainable development in our societies.

2000 The Millennium Declaration. Kofi Annan, then UN Secretary General, took the initiative to convene a summit of world leaders at UN headquarters in New York, known as the Millennium Summit. The Millennium Development Goals are eight measureable goals that deal with improving the lives of the world's poor. Attending the summit were 147 heads of state and government, and all UN member countries were represented. The goals were designed to be achieved by 2015.

2015 The Global Goals and Agenda 2030. At a UN summit in New York, heads of state and government were among representatives of the 193 UN member countries that adopted the 17 Global Goals (and 169 sub-goals). This is the most ambitious such agenda ever adopted. It unites the countries of the world behind a universal agenda and calls on all countries – both rich and poor – to act both nationally and globally to achieve the Global Goals by

### THE GLOBAL GOALS – DESCRIPTION

World leaders adopted 17 Global Goals aimed at achieving three fantastic things during the next 15 years:

Abolishing extreme poverty.

Reducing inequalities and injustices in the world.

Solving the climate crisis.

These objectives can be achieved through the Global Goals for sustainable development – in all countries and for all people. If the goals are to succeed, everyone needs to know about them.

## A LITTLE MORE BACKGROUND...

Sweden is working with the Global Goals at the government level, where there is a special delegation for implementation of Agenda 2030 for sustainable development.

## GLOBAL PERSPECTIVES IN THE SCHOOLS

The recently adopted Agenda 2030 and its 17 Global Goals for Sustainable Development will set the order of priorities for global development during the next 15 years.

The Swedish Council for Higher Education's "Global School" programme works in accordance with the Global Goals:

Goal 4 "Quality education" – Ensuring that no later than 2030, all children and young people in Swedish schools obtain the knowledge and skills needed in order to promote global sustainable development through a sustainable lifestyle:

Human rights

Gender equality

Promotion of peace and non-violence

Global citizenship

Cultural diversity

## UNESCO'S GLOBAL ACTION PROGRAMME ON EDUCATION FOR SUSTAINABLE DEVELOPMENT ALSO STATES:

*"All individuals in schools and education should be seen as leaders in the process of changing the society we live and work in. The goal is a globally sustainable society. Achieving this will require learning that is open to change and that, through its flexibility, leads to concrete actions, a critical approach and acceptance of responsibility. In this way we can find solutions to global challenges and actively contribute to a more equitable, peaceful, tolerant, inclusive, safe and sustainable world, locally and globally, now and in the future."*

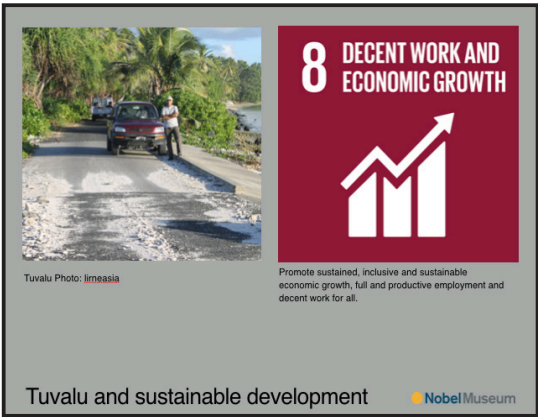
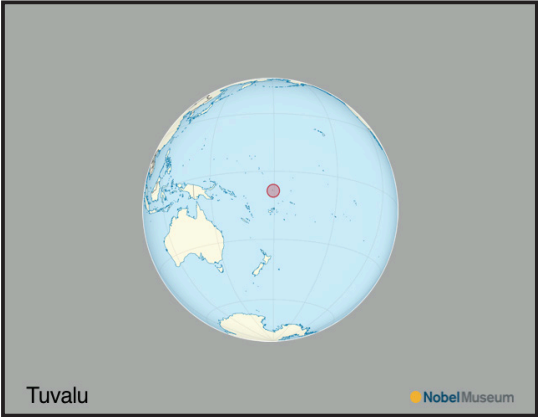
The Global Action Programme can be summarised in two points:

- (1) Improve learning and education to ensure that everyone gets the opportunity to obtain the knowledge, skills, values and attitudes that will enable them to contribute to sustainable development
- (2) Strengthen learning and education in all agendas, programmes and activities that foster sustainable development.



APPENDIX 6: SLIDE SHOW OVERVIEW

The Story of Tuvalu





Tuvalu. Photo: Claire Cullen

4

QUALITY  
EDUCATION



Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.

Tuvalu and sustainable development



9

INDUSTRY, INNOVATION  
AND INFRASTRUCTURE



Build resilient infrastructure, promote inclusive and sustainable industrialisation and foster innovation.

13

CLIMATE  
ACTION



Take urgent action to combat climate change and its impacts.

Tuvalu and sustainable development






Tuvalu. Photo: limeasia

16

PEACE, JUSTICE  
AND STRONG  
INSTITUTIONS



Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels.

Tuvalu and sustainable development





Tuvalu. Photo: limeasia

17

PARTNERSHIPS  
FOR THE GOALS



Strengthen the means of implementation and revitalise the global partnership for sustainable development.

Tuvalu and sustainable development




Game of Goals

What is most important?  
You are the UN Secretary-General and your task is to rank the goals.

Choose 3 goals that you think are the most important.  
Choose one goal that you think is of the utmost importance.



UN Secretary-General



What is most important?  
You support the school's principal and your task is to rank the goals.

Choose 3 goals that you think are the most important.  
Choose one goal that you think is of the utmost importance.




School work




Fil

Film



A sustainable future



Game of Goals

What is most important?  
What can you do? With the Global goals, we all have an obligation to contribute to sustainable development.

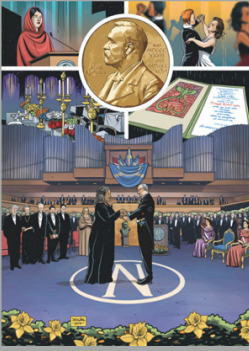
Write a concrete action that you can do to contribute to school work.  
Put your action on the tree.



Courage and initiative



The last slide



Nobel Day (10 December)

