



for a living planet®

Acting Towards a *One Planet* Future



Challenges & solutions

University material from WWF in cooperation with educators and researchers from Uppsala and Gothenburg.

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Foreword

The attaining of sustainable development is one of humankind's greatest challenges, demanding constant learning and participation from everyone in their different roles in the community. Higher education thus plays a very important part in arming students with knowledge, values and abilities that support creativity, critical acuity and the development of competent individuals.

'Acting Towards a One Planet Future' consists of material prepared by WWF to support those teaching at universities and technical colleges. We hope that the material will support you in your efforts to increase the teaching of sustainable development to your students. The material has many parts – most notably a multislides presentation which can be used during classes and lectures. Further, there is guidance with factual texts and a simple manual 'How to use the multislides presentation'. There is also a pedagogical guide.

Good luck!



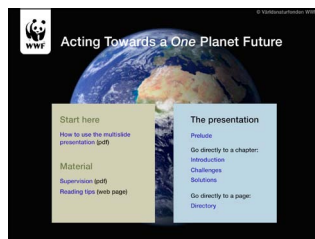
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How to use the multislides presentation

It's best to run the presentation in **whole-screen mode** (where no lists of windows or menus are shown). If the presentation doesn't open in whole-screen mode, go to Show in the Flash-Player menu and choose Whole-screen mode (or use Ctrl+F on the keyboard; apple + F for Mac).

Starting page for the educator

This is where you arrive when you open the multislides presentation.



Start the multislides presentation by clicking on Prelude.
Or go directly to a chapter by clicking on one of the chapter titles.
Or go directly to a page of your choice by clicking on Directory.

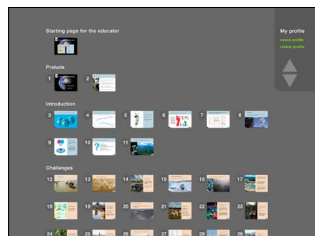
In the multislides presentation

You leaf through the presentation by using the **right and left arrow keys**, forwards and backwards.

On some pages there are **buttons** in the lower right-hand corner. Click on the relevant symbol to go to questions and exercises or to watch a film, and click on the arrow to return.



Directory



You can get to the directory with the **arrow-tangent Up**, or via the link on the Educator's starting page. The directory contains small pictures of all the pages, so you can **go directly to any page by clicking on its picture**.

To **return** from the directory to the page you came from, use the **arrow-tangent Down**.

cont.

Block pages

If there is a particular page you don't want to use in the multislides presentation, **mark it red by clicking on its page number**. That way you can hop over it in the presentation. Click again to unmark.

Save your own profile

If you want to **save your own arrangement with chosen and blocked pages** for use at another time, click on '**Save profile**' in the directory and save the arrangement under an arbitrary name on your hard disk. You can also save other profiles. When you want to fetch a saved profile, click on '**Fetch profile**' in the directory.

Support

On the Educator's start page there are links to the following sources of help:

1. How to use the multislides presentation (pdf.file) – this manual

2. Supervision (pdf file) – contains a factual text, this manual, references, reading suggestions, discussion questions and exercises, and a symbol for further reading.



Reading tips

3. Reading tips (Webpage) – tips for further reading, most in the form of web links, organised side-by-side on the basis of the presentation.

Prelude

1



Acting Towards a *One Planet* Future

Challenges and solutions. University material from WWF in cooperation with educators and researchers from Uppsala and Gothenburg.

The earth with its biosphere can be compared to an onion or an apple. The thickness of the biosphere, which is about 25 km, can be compared to the thickness of the apple's peel, or the flaky, thin onion peel. The biosphere is the same as our living-space on earth, and we live in a closed system; the laws of thermodynamics are laws of nature just like the law of gravity. Nothing disappears from the biosphere apart from heat. All fumes and other substances that are released stay inside our living-space as though it were covered with a lid. The earth is 4.6 billion years old. Resource use and environmental destruction over the past hundred years have been exceptional in a historical perspective. During the past 40 years resource use has been extra great.

Since the 1960s, just as much fossil fuels, metals and fertiliser have been used and dispersed as during the whole of the earlier history of the world.

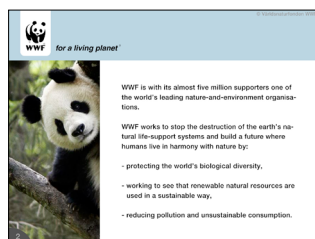
Each year we use 50 per cent more natural resources than the earth can regenerate. If the present trend continues, already by 2030 we'll need another planet to be able to provide the world's population with energy, water, food and shelter, and to be able to take care of our waste.

Sources: *Our Own Planet*, Kevin Kelly, 1988.

'Kretslopp', Nils Tiberg, Swedish Environmental Protection Agency, 1993.

Living Planet Report 2010. www.wwf.se

2



WWF - for a living planet

WWF was created in London in 1961 with the purpose of collecting money to save animals threatened with extinction. Today WWF is a global environmental organisation with a wide orientation. With its almost five million supporters, WWF is one of the world's leading nature-and-environment organisations, and uses, among other things, environmental protection, research, lobbying information and education as tools to protect the ecosystem and its species as well as solve basic environmental problems.

WWF works to stop the destruction of the earth's natural life-support systems and build a future where humans live in harmony with nature by:

- protecting the world's biological diversity
- working to see that renewable natural resources are used in a sustainable way
- reducing pollution and unsustainable consumption.

Sources: Lärande på hållbar väg. www.wwf.se.

Picture: Large Panda in the Wolong Panda Reserve, Sichuan Province, China.

Introduction

3



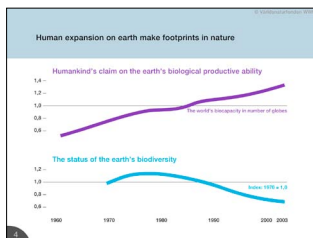
If everyone lived as we do in Europe, how many Planet Earths would we need?

Despite many researchers' believing that most calculations are only low estimates, the results send a very clear signal: If everyone lived like us Europeans we'd need about three Earths rather than the one we have. At the same time that the wealthy of the world overconsume the earth's resources, there are more than a billion people who go hungry every day. One of the greatest challenges of our time is to cooperate both locally and globally – and sufficiently quickly – to develop the solutions and lifestyles needed for people to be able to live a good life on the one planet we have. We must quickly reorient ourselves for a future on one planet.

Sustainable development can be seen as a journey, a constantly ongoing process within an ecological framework. The long-term goal is for us to obtain as good a life as possible without harming other people or the surrounding environment in either space or time. This can be formulated in three dimensions: the ecological, the social and the economic. Despite all the alarms and the efforts that have been put into intensive environmental work, the state of the earth is worsening: plants, animals and ecosystems are affected, and people are labouring under an ever-increasing environmental debt.

Sources: Lärande på hållbar väg. www.wwf.se

4



Human expansion on earth make footprints in nature

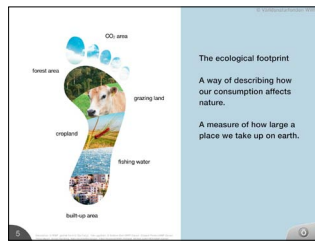
Humankind's claim on the earth's biological productive ability.

The status of the earth's biodiversity.

The Living Planet Report provides two indices of the state of the world, one being the Living Planet Index, that shows the state of health of the earth's various ecosystems, and the other the ecological footprint, that shows how much of the earth's biological productive ability is claimed by humans. The survey covers 5000 populations of 1689 wild animals. The reduction in the populations of all ecosystems stands at about 30 per cent. Biological orders where many species are threatened include, among others, crocodiles, turtles, the orang-utan and other great apes, rhinos, sturgeon, river dolphins, and amphibians such as the giant salamander. Mango forests are one of the ecosystems that are disappearing faster than any other. In South America half of the mango forests disappeared during the ten years between 1990 and 2000.

Ecological footprints estimate how large a biologically productive area is needed to produce everything we consume and to absorb the waste that accumulates. If you were to divide the earth's productive area by its population, then each of us would have less than two global hectares at our disposal. Sweden's footprint is among the largest in the world. It is a great challenge to raise the quality of life and maintain or improve everyone's health, and at the same time make the footprint diminish substantially on a global level.

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The ecological footprint

A way of describing how our consumption affects nature.

A measure of how large a place we take up on earth.

Sometimes the ecological footprint concept is used purely metaphorically to draw attention to the effects of our consumption on the environment and on people far away. Often products we buy lead to serious social and ecological problems. It can be a matter of clear-cut forestry in the tropics, which came about because of the palm oil in the chips we eat on Friday evening. Or it can be a matter of poisoned groundwater and salinised fields – both related to the cotton we wear. What we consume has consequences not only for the world's forests, seas, freshwater courses, soil, air, animal and plant life, but also for other people around the world. The effects however are seldom directly visible in our nearby surroundings. Through globalisation, many of the consequences are manifest at distant places, which makes it difficult to see the results of our behaviour and take responsibility for it.

The scientifically defined concept 'ecological footprint' is a measure (in the unit of global hectares) of how much of the earth's productive and reproductive ability we claim through our consumption. Footprint estimates for all countries with more than one million inhabitants is published every second year in WWF's *Living Planet Report*.

Forest area, CO₂ area, grazing land, cropland, fishing water, built-up area. To determine the ecological footprint for a certain product, individual, or nation, statistics must be obtained covering consumption and production in order to estimate nature's contribution in producing everything we consume, as well as absorb the waste produced. Here are included all areas on earth that we need for e.g. food, building materials, and renewable energy, and to provide space for our buildings and roads. Our use of fossil fuels is also included in the calculation. This part of the footprint is determined by estimating how large an area of newly planted forest would be required to 'capture' the CO₂ released as a result of our use of oil, coal and gas.

Sources: Living Planet Report 2010. www.wwf.se



Ecological footprints

<http://www.wwf.se/v/ekologiska-fotavtryck/1127697-ekologiska-fotavtryck-startsida>

How to determine the size of ecological footprints

<http://www.wwf.se/v/ekologiska-fotavtryck/1157938-ekologiska-fotavtryck-sa-beraknar-man-ekologiska-fotavtryck>

Where in the world can your footprints be seen?

<http://www.wwf.se/v/ekologiska-fotavtryck/1157927-ekologiska-fotavtryck-var-i-varlden-syns-dina-avtryck>

Ecological footprints – How you can help!

<http://www.wwf.se/v/ekologiska-fotavtryck/1127740-ekologiska-fotavtryck-sa-kan-du-hjalpa-till>

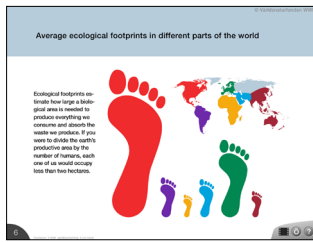


1. Ecological footprints – Interactive exercises

<http://www.wwf.se/v/ekologiska-fotavtryck/1133957-ekologiska-fotavtryck-interaktiva-ovningar>

2 Minplanet.se – Tailor-make your own action plan

http://www.minplanet.se/index.php?option=com_action&view=action&task=getArticle&article=1&Itemid=2



Average ecological footprints in different parts of the world

Ecological footprints estimate how large a biological area is needed to produce everything we consume and absorb the waste we produce. If you were to divide the earth's productive area by the number of humans, each one of us would occupy less than two hectares.

Swedes' footprints are among the largest in the world. The per capita footprint that has been calculated covers between 0.4 and 10.7 global hectares. The complete human footprint can be compared with the earth's total area of 51 billion hectares. The productivity however varies considerably over this area, three-fourths of which consists of less-productive regions, e.g. mountains, glaciers, deserts and deep-sea areas. Only one-fourth of the land is classified by the United Nation's Food and Agriculture Organisation (FAO) to be sufficiently productive of biological material to be of use to humans. The total accessible biological capacity that the footprint can be compared to is therefore 13.4 billion hectares.

If we were to take the total accessible area of 13.4 billion hectares and divide it among the number of people alive today, we would determine the accessible area per capita, which is less than two global hectares (with the growing population this area is shrinking). If all the people in the world were to share the planet's biological capital equally, each of us would have to be able to include our consumption of raw materials and energy, and our waste, within this area, which corresponds to ca. 3 football pitches. It is quite possible to do this and at the same time enjoy a good life, but it probably requires much fresh thinking as regards technology and lifestyles.



Ecological footprints. Mathis Wackernagel, vd Global Footprint Network



About water footprints <http://www.waterfootprint.org>
Living Planet Report 2010. www.wwf.se



1. What social changes do you think would be most decisive when it comes to reducing the size of the ecological footprint in the industrialised countries?

2. Which lifestyle changes do you believe would be most decisive when it comes to reducing the size of the ecological footprint in the industrialised countries?

3. Do the determinations of the sizes of people's ecological footprints show the whole of both their dependency and their impact on the earth's ecosystems?

4. Which questions about and aspects concerning sustainable development aren't included in the analyses/calculations?

5. Are there any advantages with the simplifications made in the calculations?

6. How might the ecological footprint idea, both as a concept and as a measuring instrument, enrich the discussion of sustainable development?

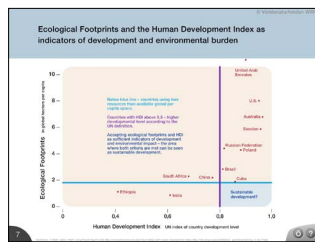


A life on *one* planet – what should we change?

Where do you think creative thinking is particularly needed when it comes to providing the pre-conditions for a good life for everyone within the limits of what the earth can tolerate?

1. Consider individually – write keywords.

2. Discuss in group.



Ecological Footprints and the Human Development Index as indicators of development and environmental burden

On the global level it's easy to see that the ecological footprint of humankind is too large. But if we are to agree about the solutions that reduce the total size of the footprint, we also have to take account of the unequal situation the world finds itself in.

You can expect that we who live in countries on the top of the footprint league will reduce material consumption and thereby the pressure on the global resource base. Very poor people on the other hand may have to increase their footprints to attain an acceptable standard of living. Thus in some countries the main challenge is to find a better path than the one the Western world has so far followed. Wouldn't it be a reasonable demand on the richer countries both to support the poorer nations in their striving towards a more resource- and energy-effective development, and at the same time to reduce one's own country's demands on the earth's limited resources and ability to receive waste? An important question in this context is how development cooperation between countries should transpire, and what one wants to accomplish with the developmental efforts.

Complementary indicators to GNP (Gross National Product) have been suggested both in the EU and the UN, in order to provide a better focus on the human needs that are not being attended to.

The Human Development Index, presented by the UN, weaves together various indicators such as length of life, infant and mother mortality, ability to read, and purchasing power. According to the UN, a country has attained a high level of development when the HDI is greater than 0.8. On a global perspective however, development can not be considered 'sustainable' if we together account for more than the planet can renew. It is for this reason that WWF has included the presently attainable biological production capacity of 1.8 hectares per capita as another important limit in the diagram. If development is to be called sustainable, a minimum criterion must be that the countries of the world, at least on average, do not find themselves above the blue horizontal line. This leaves a small space to the right of the purple, vertical line and under the blue. If you want to characterise that area as 'sustainable development' or not touch on how arbitrary the footprints and HDI are as indicators of development and environmental strain. The HDI has been criticised for not taking account of the extent of democratic or civil influence; and the footprint doesn't show for example our use of freshwater resources or the release of long-lived pollutants.

Sources: Human Development Index <http://hdr.undp.org/en/statistics/>

WWF. Living Planet Report 2010 <http://www.wwf.se/source.php/1199652/Living%20Planet%20Report%202008.pdf>

WWFs fotavtryckssidor www.wwf.se/fotavtryck



1. Which, in your view, are the most important aspects of sustainable development left out of the diagram over the HDI and ecological footprints?

2. How could cooperative development towards a good life on this planet be distinguished from today's provision of aid?



The four-corner exercise

The course leader poses a question and provides four different answers. Every answer-alternative has its own corner in the room. You can also have a fifth alternative, which is open for its own suggestions; and that group can collect e.g. in the middle of the room. The participants first individually take a position vis-à-vis the answer-alternatives they agree with. They are then asked to place themselves in the corner that best represents their answer-alternative. They then have the task of coming to an agreement with the people they're standing closest to. The course leader asks the participants from one corner at a time why they have chosen to place themselves in just that corner.

1. Which strategy or strategies do you most believe in when it comes to reducing the present overburdening of global ecosystems?

- increase the earth's ability to produce in the long run
- reduce the population

- reduce per capita consumption
- increase effectiveness in the production of goods and services

2. What are the ethical and practical consequences of your choice?

8



Sustainable development

The Bruntland Commission's definition: "A development that meets the needs of the present without compromising the ability of future generations to meet their own needs."

There are a number of definitions of sustainable development, and most of them are based on the Bruntland Commission's definition in the report *Our Common Future* (WCED 1987). There it is stated that sustainable development implies a process where the present generation satisfies its needs without jeopardising future generations' ability to do the same.

The definition encompasses aspects of human activity such as the long-term use of limited resources, how these are divided among different groups today, as well as what is being left to future generations. At first glance such a definition of sustainable development seems too simple. It leaves much room for various interpretations and sometimes contrary wishes. It may be expected that sustainable development can be understood intuitively. That is, it is assumed that different people can interpret what is sustainable in each individual case and from different perspectives. Perhaps the positive side of this is the concept's great impact and international dissemination. There is a huge interest in sustainability issues on the part of politicians, researchers and the general public, which is partly dependent on the possibility of interpreting the notion so freely. However, many have criticised the vague definition, which they believe makes the concept arbitrary. Another criticism of the notion of sustainable development gives the appearance that it is possible to continue more or less as usual, i.e. that development can continue as before, but in a greener guise.

Though there are many different definitions of the concept of development, most people take it to mean economic growth. Seeing as a large part of society's economy is dependent on energy and natural resources, increased growth would probably mean that the use of energy and resources would increase. Due to the limited quantity of our resources, and the community's striving for growth, economic development is often a question of how the resources of the world are divided between different people and countries. The greenhouse problem also actualises the question regarding the proportional distribution of emission rights between poor and rich countries. The emission of greenhouse gases, due mainly to consumption on the part of the industrialised countries, has greatest impact on the poor part of the population in the 'developing' countries.

What's the difference between sustainable development and development in the sense of how poor countries are to develop and become richer?

During the whole post-War period development theories and development in the form of project support have been concerned with how poor countries and populations should be able to modernise in order to increase general welfare. In the concept of sustainable development there are some differences of principle in comparison with the common concept of development. While the development discussion has focused on the poor countries, sustainable development concerns just as much the rich countries' continuing social change.

Further, the relation between rich and poor nations is decisive within the framework of sustainable development – and here lies one of the most controversial and difficult questions. It has to do for example with: Do the rich countries have to give up anything in order for the poor countries to develop? Is there some kind of global justice that we must adopt? Is there any 'everyone's right to sustainable development', and

in that case are there any duties connected with that right?

Good examples of such conflict areas are the over-fishing of the world's oceans, and climate change. If there exists an upper limit to the extent that the sea can be harvested of fish, and at the same time we admit poor countries' right to fishing waters, it has to mean that the rich countries reduce their harvesting of the seas. If there is an upper limit to how much greenhouse gas the atmosphere can tolerate, and we at the same time admit poor countries' right to development, it has to mean that the rich countries (who are responsible for the emissions to date) reduce their emissions. This aspect sometimes appears in the political rhetoric about sustainable development, but far too little in action.

The debate about sustainable development has gone on for more than two decades – since the Brundtland Commission came with its report in 1987. The definition of sustainable development places emphasis on our needs. What are they? That is a difficult question, even if there exists a minimum level that we can call fundamental human needs: sufficient food and water, protection against weather and wind, protection against violence and illness, access to education, the ability to support oneself, justice, and friends.

One view stemming from work with the UN's Millennium Declaration is that we must see to it that these fundamental human needs can be satisfied for *all* people without harming the planet's life-sustaining systems – the atmosphere, the water cycle, the soil, and biological diversity. With the help of this viewpoint it is easier to concretise what is meant by the concept, and thereby also easier to formulate a multidisciplinary higher education for sustainable development.

In a collected analysis of the UN's work with sustainable development and the definitions of the concept that have been brought forward within the UN system, four ethical principles are noted:

- ecological – or physical – sustainability
- global justice
- justice between the generations, and
- citizen participation.

The key question in the concept concerns ecological sustainability – the limits of society's economic development – as well as the development's temporal- and spatial-fairness aspects.

How many Westerners would accept a shoe factory in their municipality which admittedly produces cheap shoes but with the help of employees who are underage, receive paltry pay, work 12–14 hours a day, seven days a week, are denied schooling, and where the factory moreover emits poisonous waste so that you can't bathe in the nearby bay? That most people still buy such cheap shoes depends on the separation of production and consumption, which is the effect of increased globalisation. The production occurs at one place, and the consumption at another. Another reason can be that the strong belief that economic growth creates preconditions for solving all environmental and resource problems has etched itself into the political rhetoric.

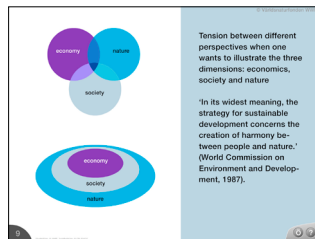
Now that sustainable development has been introduced as a general moral ground in higher education, it is important to carry on a deepgoing debate about what sustainable development really means for all countries and all people. And at the same time that this debate is going on, we must see to it that our life-sustaining global ecological systems – the atmosphere, water, the soil and biological diversity – are protected and preserved.

There is an important ethical dimension in sustainable development that has to do with justice, rights, and obligations between groups, countries and generations. This debate must be kept alive at universities and technical schools. Sustainable development is, as a concept, normative. It is also difficult to define, and it is used by different groups to advance their own interests. Even more important is to discuss the concept and reflect on it.

Sources: World Commission on Environment and Development, *Our Common Future*, Oxford University Press, 1987.
Jacob, Merle, 1996, *Sustainable Development: A Reconstructive Critique of the United Nations Debate*, 2005.
Hållbar utveckling underifrån: Lokala processer och etiska vägval, Nya Doxa, Nora.
Hållbar utveckling och lärande www.wwf.se

-  **1. At the Rio conference in 1992 the nations of the world agreed to curb the negative ecological trend by investing in sustainable development; but what does the concept sustainable development mean?**

2. What can we not allow to fall apart but must be sustainable?
3. Which or whose development is being referred to?



Tension between different perspectives when one wants to illustrate the three dimensions: economics, society and nature

'In its widest meaning, the strategy for sustainable development concerns the creation of harmony between people and between people and nature.' (World Commission on Environment and Development, 1987).

The idea behind the three dimensions of sustainable development is that development within these dimensions should not take place at the expense of one another. Emphasis on the three dimensions also reminds us that a multi-disciplinary mode of attack is needed in order to attain sustainable development. Sometimes different opinions arise about how best to describe the relation between the economic, ecological and social circles.

Some people do not want to ascribe a hierarchical internal relation to the dimensions, but emphasise rather the importance of equality, as well as doing what are termed trade-offs – bartering between ecological, economic and social interests. Others mean that the ecological dimension constitutes the outermost framework for all human activity. At the same time the social dimension, with its norms, valuations and laws, itself constitutes the preconditions for the exchange that takes place between people in the economic dimension. According to this perspective the three circles constitute subsets of each other, with the ecological dimension constituting the outer framework.

It is maintained already in the Brundtland report that the realisation of sustainable development demands thoroughgoing social changes, a 'process of change where resource use, choice of investments, orientation towards technological development and institutional changes are such that they become compatible with present and coming generations' needs'. (WCED 1987:9)

Sources: Sverker C Jagers. *Hållbar utveckling som politik*.



On the homepage of the association Vetenskap för Hållbar Utveckling (Science for Sustainable Development) the question of how one can view sustainable development's different dimensions is discussed; and on the same homepage a vote is also taken about these dimensions: www.vhu.se.

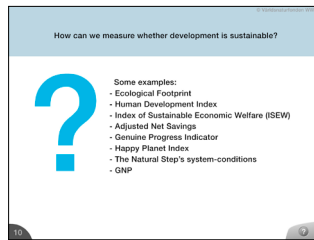


1. Which way of illustrating the three dimensions do you prefer?
2. How is the relation between the three dimensions described in your course literature?
3. What advantages and disadvantages do you see with the different ways of illustrating sustainable development?



Students search the net for different definitions of sustainable development.

1. Reflect over the sorts of contexts in which the definitions occur. Which are the – possibly invisible – target groups? Why might it be that just that definition is used?
2. Reflect too over the relation between economic, ecological and social sustainability in the definitions the students have found.



How can we measure whether development is sustainable?

Some examples:

- Ecological Footprint
- Human Development Index
- Index of Sustainable Economic Welfare (ISEW)
- Adjusted Net Savings
- Genuine Progress Indicator
- Happy Planet Index
- The Natural Step's system-conditions
- GNP

Different indicators of sustainable development give different pictures of what has to be changed for development to be sustainable.

The Human Development Index is an indicator that complements the GNP with further statistics, with the aim of judging people's life-situation and the degree of development in the relevant country. The index is used in the same way as GNP to compare welfare in different countries. While the GNP focuses on material welfare, one tries through the HDI to give a more complete picture, since it is a weighing together of expected longevity, level of education and GNP. The measure was created by the Pakistani economist Mahbub ul Haq (1934–1998), and has been used since 1990 in the annual Human Development Reports prepared by the UN's development programme, UNDP.

One of the more social-scientifically based attempts to construct an indicator of economic welfare and an alternative to GNP is the Index of Sustainable Economic Welfare (ISEW). It attempts to measure the economic activity that leads to improved quality of life. The index weighs together 19 factors, many of which are also important for the determination of the GNP. Deductions are made for, for example, air pollution, while unpaid household work is included. One also tries to take account of social injustices and the use of natural resources. The ISEW purports to be a measure of sustainable welfare. But taking account of the environment and justice doesn't guarantee that a country's development is socially, politically or ecologically sustainable. It is easy to imagine environmental catastrophes or political disturbances despite one's attempting to avoid just them. To assume that a form of development or growth according to the ISEW is 'more sustainable' than economic growth in GNP-terms is reasonable however, since more factors are weighed in.

Another example is constituted by the four system-conditions that have been defined by the institution The Natural Step in cooperation with researchers.

In the sustainable society nature is not subject to systematic:

- increase in the concentration of substances from the bedrock (e.g. coal and heavy metals).
- increase in the concentration of substances from society's production (e.g. Nox, or hormone-disturbing substances).
- supplanting of nature by physical methods (e.g. by creating traffic infrastructure, deforestation, over-fishing, etc.).

And, in such a society people are not systematically prevented:

- from meeting their own needs (e.g. via the misuse of political and economic power).



On the UN's global development programme www.undp.se

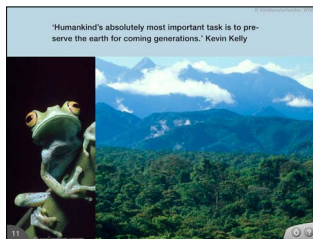
On the UN's Beyond Growth conference <http://www.beyond-gdp.eu>

About ecological footprints (in Swedish) <http://www.wwf.se/vart-arbete/ekologiska-fotavtryck/1127697-ekologiska-fotavtryck-startsida>

On other indicators of sustainable development <http://www.beyond-gdp.eu> <http://www.foe.co.uk/community/tools/isew/>
 On indirect emissions caused by industrial nations' consumption http://assets.panda.org/downloads/eu_consumption_global_pollution.pdf
 On Swedish consumption's effect on the climate <http://www.naturvardsverket.se/sv/Klimat-i-forandring/Konsumtion-och-klimat/Konsumtionens-klimatpaverkan/>
 About The Natural Step www.thenaturalstep.org

1. Which of these indicators have you come across before?
2. In which contexts are these and other indicators used?
3. On which aspects of sustainable development do the different indicators focus?
4. Discuss GNP as a measure of sustainable development. Give examples of factors that promote growth but which are unsustainable in a long-term perspective.

11



'Humankind's absolutely most important task is to preserve the earth for coming generations.' Kevin Kelly

Pictures: Ordinary tree frogs in Ecuador, the western Andes, Mindo-Nambillo nature reserve. La Planada nature reserve, Columbia.

1. Which environmental and development questions are most important for you?

Reflection

Before the group discussion, let the students write reflectively about what you have previously gone through in the presentation. Ask them also to briefly write about their emotional reactions.

1. What have you learned that you didn't know before?
2. How have you reacted?
3. How will you act now – have you any ideas about what you would like to do?

Challenges

12



Increase in natural catastrophes

Climate changes are natural

If we look at history we see that the climate has always changed. Our earth has been both warmer and colder. From the time that the last dinosaurs died out 65 million years ago however, large climate changes have mainly taken millions of years. The balance between the sea and the atmosphere, especially regionally, can shift completely naturally, and give rise to temporary variations in temperature and precipitation (one example is the weather phenomenon El Niño). Other factors such as solar radiation, and volcanic gases and particles, can push both temporary shifts and more comprehensive changes in the climate.

Greenhouse gases absorb radiation

What is termed the greenhouse effect is basically a natural phenomenon. The term is used to describe certain gases' effect on the climate. Our most important greenhouse gas is ordinary water vapour, which accounts for the major portion of the natural effect. The quantity of water vapour in the atmosphere depends on the temperature, which is in turn influenced by other naturally occurring greenhouse gases such as carbon dioxide, methane and nitrous oxide. The greenhouse gases can be compared to a blanket that lays itself around the earth – and under the blanket it is warmer. About two-thirds of the radiation from the sun is absorbed at the surface of the earth and in the atmosphere. The rest is reflected back into space. In order that the temperature not rise, the earth must release the same amount of energy as it receives. This takes place in the form of the radiation of heat. The greenhouse gases in the atmosphere capture the reflected heat radiation and redistribute the energy. We then obtain the 'blanket-effect' as a result. The natural greenhouse effect raises the earth's average temperature by more than 30°C, and is thereby a precondition for life on the planet.

People affect the balance of nature

Almost all climate researchers agree that the accelerating climate change we see today is largely a result of human activities. Our consumption and production disturb nature's balance, and we see an ever-accelerating change in the climate. The greenhouse gases we release make the 'blanket' in the atmosphere thicker, and it slowly becomes warmer under it. We lack complete knowledge about the climate system, but the amplified greenhouse effect is a fact. If we don't change our pattern of living it isn't a question of whether we will be hit by catastrophe, but how big the catastrophe will be, how quickly it will happen, and where it will hit hardest.

Complex climate system

Far too often the greenhouse effect is described only as a gradual warming of our planet. The climate system however is very complex, and a temperature increase can lead to changes in the climate that both worsen and ameliorate the greenhouse effect. When the temperature rises, more low clouds, for example, can form, which in turn can shadow the earth more and compensate for some of the warming. Clouds however are a very complicated part of the climate system. If we have more high clouds the warming would instead be amplified. The accelerating greenhouse effect can also contribute to the thawing of the tundra, in which case the greenhouse gas methane is released. When glaciers and sea ice melt as a result of a warmer climate, land and ocean are also laid bare. Darker areas reflect less solar radiation than lighter, and the warming is amplified. That our planet could be caught in a rapidly descending spiral as a result of phenomena like this is a worrisome thought.

Human influence – An amplified greenhouse effect

Today's global warming affects both nature and humans, and it is we who are the cause. The burning of fossil fuels (coal, oil, and natural or fossil gas), agriculture and deforestation have led to increased quantities of greenhouse gases in the atmosphere. There isn't time for vegetation to absorb these gases, and they

end up outside the natural cycle, and we experience an amplified greenhouse effect as a result. Human activities lie behind emissions of both naturally occurring greenhouse gases, such as carbon dioxide, methane and nitrogen, and a large number of artificial gases, for example chlorofluorocarbons (CFCs) which were introduced by us humans.

Carbon dioxide the most important greenhouse gas

During the last 30 to 50 years we have noted every more clearly that increases in the amount of greenhouse gases in the atmosphere push climate change. Since the beginning of industrialisation the amount of carbon dioxide in the atmosphere has increased from not quite 280 ppmv (parts per million per volume) to 380 ppmv. The largest part of the increase dates from after World War II.

The more carbon dioxide we release, the more water vapour that builds up in the atmosphere, which further amplifies the greenhouse effect. If you divide up the effects of the various greenhouse gases, carbon dioxide (CO₂) today lies behind 60 per cent of the total amplification. Roughly estimated, we could never, even with a complete stop in our release of carbon dioxide, completely avoid a certain continued climate change. Greenhouse gases accumulate in the atmosphere, and further, there is an inbuilt inertia in the climate system due to the long time it takes for the world's oceans to heat up. The increase in temperature we see today is the result of gas releases that occurred earlier in history. To date we have only seen a part of the warming that will result from the amplified greenhouse effect during the 20th century.

Rich nations behind most CO₂ releases

We who live in the rich part of the world lie behind most of the gas releases that affect our climate. In 1999, G8 countries (the US, Great Britain, Canada, France, Germany, Italy, Japan and Russia) caused almost half of the global release of carbon dioxide. From an historical point of view, the responsibility of the rich countries is even greater, since we have built a large part of our wealth on burning fossil fuels and felling forests. Apart from our having the best preconditions, we therefore also have an ethical responsibility to switch to sustainable energy and transport systems.

The energy sector is the worst in the world

From a global point of view, today's transportation and the production of electricity release the greatest amount of carbon dioxide. The energy sector is responsible for 36 per cent of the total releases, and today more than half of all electricity comes from the burning of coal, oil, and fossil or natural gas. The transportation sector lies in second place, with 27 per cent of all carbon dioxide releases.

Antiquated energy systems are exported

Today we see a negative trend where rich countries retain antiquated energy systems based on fossil fuels and nuclear energy – energy sources that have no place in a sustainable society. Apart from the fact that countries are unwilling to switch to sustainable energy systems at home, where the change must begin, they export old systems to poor countries. A large majority of today's export and financing of technology transfer thus still leads to the poorer countries following in our unsustainable footsteps, despite the present existence of more sustainable alternatives that are even attractive economically.

People, animals and nature are threatened

The amplified greenhouse effect has serious global consequences for both humans and nature, though the local effects vary. An investigation by WWF shows that a third of the natural living environment for plants and animals can disappear within 100 years due to global warming – we don't know if similar environments will exist elsewhere. As a result, species dependent on particular environments can be driven to extinction.

Sensitive ecosystems, threatened species of plants and animals, and areas that are already strongly affected by emissions or deforestation are the most vulnerable. Most of the process is a combination of rapid and gradual climate changes that make the ecosystem collapse. From an evolutionary perspective, today climate zones often shift unusually quickly. Species are then pressed to the limit. If an extreme weather phenomenon also occurs, such as flooding, a heat-wave or drought, the species can disappear.

Effects today

The effects of climate change are noticed over the whole world. We already see:

Global glacier melting. A WWF report on climate change shows that with the melting of the ice, the likelihood of losing ecosystems, flooding and a scarcity of drinking water all increase. Millions of people in low-lying areas are in danger.

A reduction in the area of the polar ice cap. In 2002 the ice had diminished by nine per cent as compared to the median value for the previous decade. Measurements from the National Snow and Ice Data Center, which is responsible for measurements at NASA, show that the ice is melting ever more quickly. Polar bears that are dependent on their natural living environment are threatened.

Drought and heat waves. A WWF report shows that the amplified greenhouse effect was most likely a key factor in Australia's being hit by its worst drought ever in 2002. A heat wave taking 35,000 people's lives swept over Europe the same year, and cities in the US and India experienced heat waves.

Animals that die. The stock of North-Atlantic salmon declined drastically when sea temperatures rose 6°C above normal in 1997. The warmer the water becomes, the more food the salmon require. If it becomes too warm, the fish starve.

The sea level is rising. When water is heated its volume increases. Melted water from glaciers adds to this. Island nations in the Indian Ocean, and the Fiji Islands in the Pacific, have already been hit by rising sea levels, and data from the Intergovernmental Panel on Climate Change (the IPCC) show that some of them can disappear.

Increasing costs for climate-related catastrophes. On the initiative of the UN, experts from the Swiss Re insurance company annually compile reports on the costs of catastrophes. In 2003 natural catastrophes cost 58 billion USD, and it seems that a trend of increasing costs will continue. Similarly, a report from the United Nation's Environment Programme (UNEP) points out that almost two-thirds of all catastrophes in Europe since 1980 have been caused by storms, flooding and extreme weather, and that the economic losses have doubled in 20 years. Among other things, more people are moving to cities, and building more in exposed areas. In combination with the increase in natural catastrophes, damage costs thus increase.

Effects in the future. In the relatively near future we will be seeing:

More forest disappear. A WWF report shows that one-third of the world's forests is threatened, and can disappear during this century. Many plant and animal species can find it difficult to adapt or move in step with the climate changes, and risk being eliminated.

More natural catastrophes. *[Upprepning av 2 sidor neråt: Hurricanes, flooding and extreme drought can come to cost both lives and more money for catastrophe aid. The world can also experience an increase in refugees as a result.] According to the annual catastrophe report of the Red Cross, since 1998 a whole 25 million people can have been forced to flee their homes as a result of natural catastrophes.

Increasing spread of tropical diseases. Climate changes can lead to the spread of malaria and similar illnesses to new areas, according to researchers from the Harvard Medical School. The West Nile virus was discovered for the first time in the United States in 1999. Normally the virus exists at southerly latitudes in Africa, Asia and the Middle East.

Sources: Science. <http://www.wwf.se/v/klimat/vetenskapen/1124260-klimat-vetenskapen>
Human influence. <http://www.wwf.se/v/klimat/m/1124268-klimat-mansklig-paverkan>
Consequences. <http://www.wwf.se/v/klimat/konsekvenser/1124276-klimat-konsekvenser>

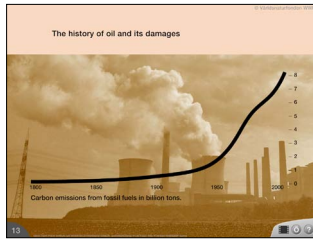
Picture: Flooding in Hunan Province, China.



Stop global warming – save the climate <http://www.wwf.se/v/klimat/1164070-klimat-startsida>
http://www.earth-policy.org/index.php?plan_b_updates/2003/update29

Record Heat Wave in Europe Takes 35,000 Lives http://www.wwf.org.au/publications/drought_report/

Global warming contributes to Australia's worst drought http://www.wwf.org.au/publications/drought_report/



The history of oil and its damages

Carbon emissions from fossil fuels in billion tons. To produce one kilo corn, the American farmer needs 33 times as much energy – which he has to buy – as the traditional farmer in Mexico. To produce one kilo of rice, 88 times more energy is used by the American farmer than by the rice-grower in the Philippines. The burning of fossil fuels, together with increasing deforestation, melting permafrost, and food production, causes large releases of greenhouse gases. Furthermore, the sea's ability to buffer carbon dioxide has diminished.

The production of food today alone accounts for close to one-third of the global release of greenhouse gases. This has a large effect on the climate, and changes in it have serious global consequences for both people and nature, though the local effects differ. Some investigations show that one-third of the natural living environment for plants and animals can disappear within 100 years thanks to global warming. We already see that many glaciers have begun to melt, which increases the risk of losing ecosystems, flooding and a scarcity of drinking water. Millions of people in low-lying countries are in danger. In 2002 in the arctic alone the ice diminished by nine per cent more than the median temperature of the last few decades. Measurements show that the ice is melting ever more quickly.

The development we see is actually significantly worse than the 'business as usual' scenarios in climate models. The increase in carbon dioxide is itself increasing, says Kevin Tranberth at the National Center for Atmospheric Research in the US and the UN's climate panel IPCC.

Higher temperatures lead to drought, heat waves and fires being more common and more extreme. When the temperature of the sea rises, its volume increases, and the sea level rises. On top of this there is runoff from the glaciers and other masses of ice. Data from the IPCC show that island nations in the Indian and Pacific Oceans are threatened by the rising sea-level, and some of the islands risk disappearing completely. The weather will also be more difficult to forecast, and more extreme weather phenomena will occur more often. *[Upprepning av två sidor uppåt: Strong winds, flooding and more extreme drought costs both lives and money for catastrophe aid. As a result of climate changes the world can end up with more refugees.] And malaria and other illnesses can spread to new areas.

The warming climate is not only a danger to the global ecosystem, but to the world's economy as well, since such a large part of the economy is based on access to cheap oil. Ever since humans began to extract oil, its consumption has only increased. Modern society has been constructed with the help of fossil fuels. Thanks to oil we can build and drive cars, aeroplanes and power stations, and carry on a multitude of industrial processes. We can make plastic, clothing, medicines, CD-discs, computers and thousands of other products.

According to many people we are now approaching the peak in world oil extraction, or 'peak oil', which will occur when our extraction of oil reaches its maximum. Its subsequent decrease will continue until it has disappeared. Peak oil will come sooner or later, since oil is a finite resource; but exactly when this will occur is debated. According to some, peak oil has already passed. Similar patterns also apply to many other resources, including water, forests and fish. All limited resources peak if they are overused. But the pattern is clearest just as regards fossil fuels. Once they have been used, they cannot be renewed within a humanly foreseeable future. Dependence on fossil fuels is very clear when it comes to food production in the West. To feed the average American requires 1500 litres of oil per year. One researcher has expressed this as though the food we eat is really made of oil. For example, the production of mineral fertiliser from natural gas requires one-third of the energy used in agriculture. Mineral fertiliser is a large source of the release of greenhouse gases, and perhaps the largest energy cost in agriculture. Before industrialisation the amount of carbon dioxide in the atmosphere was 272 ppm (parts per million).

- In the year 2000 the carbon dioxide content was 350 ppm.
- Today it is 385 ppm.
- Researchers have set 440 ppm as an absolute maximum for what the climate can handle. Ever more

reports indicate that the climate is probably even more sensitive than this, and 350 ppm has become the number used all the more frequently by climate researchers.

Sources: *Peak Everything*, Richard Heinberg, New Society Publishers, 2007.

Malcolm J. & Markham A., 2000, *Global Warming and Terrestrial Biodiversity Decline*.

WWF www.klimathotet.net

Lagerberg Fogelberg, C., 2008, På väg mot miljöanpassade kostråd: Scientific basis for the environmental-consequences analysis by the Swedish National Food Administration's dietary recommendations. Rapport 9 – 2008.

Livsmedelsverket, Sweden. *Miljörapporten*, 28 Nov. 2008.

Odum & Odum, *A Prosperous Way Down - Principles and Policies*, University Press of Colorado 2001.

Robelius 2007 'Giant oilfields – The highway to oil', Uppsala University.

http://assets.panda.org/downloads/wwf_science_paper_october_2008.pdf

 The history and damages of oil, Will Steffen, professor, Australian National University

 1. Describe the most important changes that you see before you when the price of oil rises and accessibility diminishes.

2. Which groups are harder hit by our present oil-dependency and will be harder hit by peak oil?

 Reflections concerning living, working and travelling in daily life.

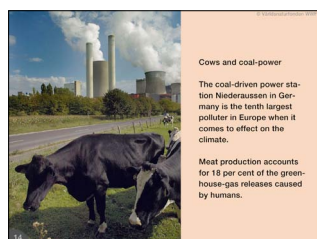
Form groups, each of which takes an area.

1. Write up as many aspects as possible of the role played by oil and its products in our daily lives.

2. List the alternatives that already exist to these uses of oil.

3. Make a list of what will have to be changed when oil disappears – behaviour, products, services ...

14



Cows and coal-power

The coal-driven power station Niederaussen in Germany is the tenth largest polluter in Europe when it comes to effect on the climate.

Meat production accounts for 18 per cent of the greenhouse-gas releases caused by humans.

According to a WWF study, the coal-driven power station Niederaussen, close to Cologne, is the tenth largest polluter in Europe when it comes to effect on the climate. The energy sector is responsible for 36 per cent of the total releases – over 700 tons CO₂ per second – and about 40 per cent of this energy is generated from coal. This has a greater effect on our climate than any other single human activity. Coal is also the most accessible fossil energy source in the world, existing in about 70 countries, and is considered cheap if one doesn't include the costs of all the problems its use gives rise to.

The climatic effect of our great meat consumption is taken up in the 400-page report, *Livestock's Long Shadow: Environmental Issues and Options*, which has been produced by, among others, the UN's agricultural organisation (the FAO) and the World Bank. It shows how important it is that we in the rich part of the world change our eating habits and reduce our consumption of meat.

Animal husbandry today causes two-thirds of humans' total releases of one of the most potent greenhouse gases, nitrous oxide. Trends suggest a continued fast increase. More, animal husbandry is responsible for 35 to 40 per cent of humans' release of methane, and nine per cent of our release of carbon dioxide.

Deforestation takes place for fodder production, which has a negative effect on the climate.

Globally, 46 per cent of cereal production is for fodder. In the EU the figure is 64 per cent. In Sweden over 80 per cent of cereal production goes to fodder.

Sources: *Livestock's Long Shadow: Environmental Issues and Options*, FAO 2006.

Picture: Coal-driven power station Niederaussen, Germany.

15



Life changes when the earth is heated up

Polar bears' habitat disappearing

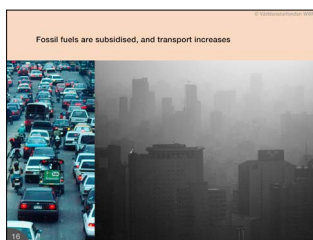
A study by the US Geological Survey shows that **two-thirds of the world's population of polar bears can have disappeared by the year 2050 as a result of climate change and the melting of ice in the arctic.**

Large changes have taken place in the animal and plant kingdoms, and these depend mainly on climate change. Most of the changes in the physical systems on earth depend on temperature increase. It's a matter of shrinking glaciers, rising sea-levels, melting permafrost and ever-earlier spring floods.

The ice in the sea can shrink faster than according to our present projections, as has been pointed out by researchers, who see a clear connection between changes in the sea ice and the health and well-being of polar bears. The study covered six months. As the area of the sea-ice diminishes, so does the size of the polar bears' hunting-grounds, where they obtain their main diet of seals and fill their fat-supply in preparation for winter. The polar bear has become an important symbol for the consequences of the ongoing climate change.

Sources: www.wwf.se

16



Fossil fuels are subsidised, and transport increases

Personal transport accounts for about one-third of the global release of carbon dioxide.

The transport sector accounts for the fastest growing part of Europeans' release of CO₂.

The European transport sector's use of energy increased by 29 per cent between 1990 and 2004.

Globally, the coal, oil and gas industries are supported by subventions totalling about 235 billion dollars a year. These subventions are many times larger than the whole world's investment in renewable energy. In the US the subventions going to oil and gas are 39 billion dollars annually, to coal, eight billion dollars, and to nuclear energy, nine billion. The fishing industry is subsidised by 22 billion dollars. In Great Britain airline companies are subsidised by about 18 billion dollars per year in tax reductions, or 'tax breaks'. Public subventions to fossil fuels are significant also in the EU, and in Sweden in particular. Mining coal is especially supported, but so is the mining of other fossil fuels. This is clearest in Germany and Poland.

Each year the people of Sweden pay 45 billion kronor supporting fossil fuels. That is 5000 kronor per person, mainly in the form of freedom from taxation. Every year airlines, for example, receive 5 billion kronor in support.

Internationally, of all federal research support given in the energy sector, windpower has received 0.03 per cent since 1974. Nuclear energy has received 60 per cent, which equals 175 billion dollars, according to the international energy organ IAEA.

Sources: Riksdagens utredningstjänst 2007, EUs miljömyndighet, European Environment Agency (EEA) 2004.

'Plan B 3.0' – Lester Brown 2008, www.greenpeace.org, www.neweconomics.org.

Kendall, G. (2008) *Plugged-In – The End of the Oil Age*, WWF, Brussels.

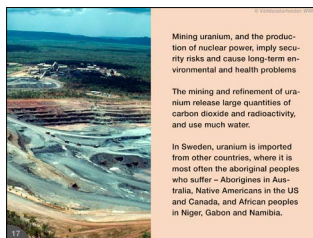
Pictures: Traffic jam in Bangkok. Smog in Mexico City.



On the subsidising of fossil fuels globally http://www.neweconomics.org/gen/z_sys_PublicationDetail.aspx?PID=182.

On transport http://assets.panda.org/downloads/plugged_in_full_report___final.pdf.

17



Mining uranium, and the production of nuclear power, imply security risks and cause long-term environmental and health problems

The mining and refinement of uranium release large quantities of carbon dioxide and radioactivity, and use much water.

In Sweden, uranium is imported from other countries, where it is most often the aboriginal peoples who suffer – Aborigines in Australia, Native Americans in the US and Canada, and African peoples in Niger, Gabon and Namibia.

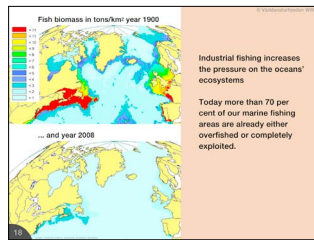
Uranium is also mined in such countries as Uzbekistan and Russia. After the mining, a sort of sand-porridge remains as waste. The waste contains, besides chemicals and a number of heavy metals, close to 90 per cent of the original radioactivity. At the Rössing mine in Namibia, about 10 million tons of concentrated potassium sulphate is dumped every year. More, the complex in the Namibi Desert in Angola uses 40,000 cubic metres of water per day in one of the world's most water-poor areas.

Many miners contract lung cancer due to the radon gas. Radon is a substance that forms when uranium decays. People who live nearby or downstream from the mines risk illnesses of various kinds. The waste is lethal for 100,000 years. The over 400 nuclear reactors in the world produce 10,000 tons of radioactive waste each year.

Calculations on the part of the Swedish Nuclear Fuel and Waste Management Company (SKB) show that it will be significantly more expensive than previously thought to take care of future Swedish nuclear waste. The bill for the whole of the Swedish nuclear-waste programme is reckoned to be almost 110 billion kronor. That is 23 billion more than in a prognosis from 2007.

Sources: http://www.skb.se/Templates/Standard___25338.aspx. www.karnkraftsinformation.se. www.folkkampanjen.se.

Picture: Uranium is mined in strip mines in Jariba, Northern Territory, Australia.



Industrial fishing increases the pressure on the oceans' ecosystems

Today more than 70 per cent of our marine fishing areas are already either overfished or completely exploited.

Globally, the fishing industry employs 200 million people. There are around 30 million fishermen and more than 4 million fishing boats out at sea. Of them, about 80 per cent are what are termed artisan fishermen, almost all of whom live in poor countries. The world's professional fishermen harvest about 94 million tons of fish each year. These figures reflect a fishery that in many places literally vacuums the sea for fish and other edible organisms. It is true that fishing fills a very important socio-economic function which we cannot ignore, but today's industrial fishing is unsustainable in the long run.

Large fishing boats equipped with effective catching gear, often supported with generous subsidies from e.g. the EU, hunt the seas for shrinking schools of fish to keep up with the competition on the global market. Four-fifths of the EU's commercially important stock of fish is considered to be overfished. Studies show that more than 90 per cent of all large predatory fish in the world have been eradicated by professional fishing. This not only leads to problems with people's accessibility to consumable fish, but it also disrupts the ecological balance of the seas. Fishing methods such as bottom-trawling damage the ocean floor and its organisms. Yet another problem is that one-fourth of the catch, what is termed bycatch, is dumped. The list of the challenges in the sea includes pirate fishing. A study of pirate fishing in the Baltic shows that as many as every second cod is caught illegally.

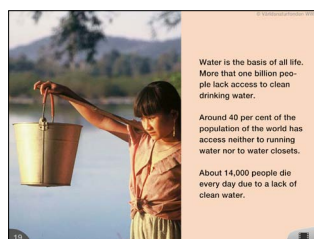
Fish populations are not only affected by pressure from fishing, but also by pollution from the land – everything from garbage and oil to poisonous chemicals and biocides. Over-fertilising worsens the situation by leading to greater quantities of phosphorous and nitrogen in the water. This has led to, for example in the Baltic, the complete lifelessness of larger and larger areas of the sea floor. Here both agriculture and industry have a great responsibility. Along the coasts the sea is also affected by increased population pressure. Today half of the world's population lives in coastal areas, and the proportion is only growing. This means that coastal ecosystems are being subjected to ever harder physical exploitation through the building of harbours, sea traffic, tourism and other human activities.

Sources: FAO, www.wwf.se

Picture: The fish biomass. Comparison of the year 1900 and today.



The sea as a provider <http://www.wwf.se/v/hav-kust/havets-m/havet-som-f/1133371-havet-som-forsorjning>
 Fishing <http://www.wwf.se/v/hav-kust/problem/fiske/1133386-fiske>
 Over-fertilisation <http://www.wwf.se/v/hav-kust/problem/1007315/1133404-overgodning>
 Pollutants <http://www.wwf.se/v/hav-kust/problem/f/1133410-fororeningar>
 Coastal exploitation http://www.panda.org/about_our_earth/blue_planet/problems/tourism/
 Shipping <http://www.wwf.se/v/hav-kust/problem/sj/1133433-sjofart>



Water is the basis of all life. More than one billion people lack access to clean drinking water.

Around 40 per cent of the population of the world has access neither to running water nor to water closets.

About 14,000 people die every day due to a lack of clean water.

All animals, people and ecosystems are dependent on clean water to survive. But according to the UN, one-third of the world's population lives in countries where the problems of supplying water are serious or very serious.

The annual value of the earth's collected fresh-water resources was estimated to be more than 70 billion dollars. Agriculture, waterpower, industries, transport, drinking water and livestock place heavy pressure on the earth's sources of fresh water. Lower water levels in lakes, the draining of wetlands, and the building of dams are examples of activities that worsen the situation. To meet the increasing need for electricity and irrigation, ever more dams are being built. Today there are some 50,000 dams in the world, which affect about 80 per cent of the earth's larger watercourses. A dam regulates a watercourse's natural flow, and changes the living conditions for many plants and animals, which can consequently have difficulty surviving. To make room for a dam, often large groups of people must leave their land. The dams can also lead to a shortage of clean drinking water. Climate changes also affect the supply of water. With the shrinking of the glaciers about one billion people will risk losing their main source of water.

Investigations show a drastic reduction in fresh-water ecosystems lately. To preserve the freshwater ecosystem it is important that development take a form where humankind can be supplied with clean drinking-water, WC-water, irrigation and electricity without endangering future generations' access to clean water.

Sources: Stålgren och Tropp - Water Integrity Network, WWF Eko no. 3 2006, *Living Planet Report*, Hails 2006, KRAV.

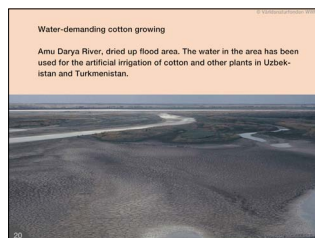
Picture: Vietnamese girl with bucket at the Serepok River.

 Melting glaciers and the supply of fresh water, George Monbiot, Guest Professor at Oxford Brookes University.

 Globala sötvattensproblem <http://www.wwf.se/vart-arbete/sotvattenvatmarker/problem/1128258-globala-sotvattensproblem>

Våtmarker och sötvatten — naturens blodomlopp <http://www.wwf.se/v/s/1122972-vatmarker-startsida>

20



Water-demanding cotton growing

Amu Darya River, dried up flood area. The water in the area has been used for the artificial irrigation of cotton and other plants in Uzbekistan and Turkmenistan.

For more than 5000 years, fibres from the cotton plant have been used to make clothing and other textiles. Today cotton contributes to almost half of the world's textile production. The growing cotton industry constitutes a serious threat to unique habitats and to the fresh-water supply of thousands of people in the poor, cotton-producing countries in the south. But it should be kept in mind that the cultivation of cotton, and the different steps in its production, are of great economic significance. In Mali, cotton accounts for 50 per cent of the value of exports, in Pakistan, 65 per cent, and in Uzbekistan a whole 75 per cent! Other countries with a large cotton production are China, India, the US, Brazil, Egypt and Turkey.

Draws hard on the freshwater systems of the world

Cotton is grown mainly in tropical and subtropical regions, and since the cultivation often takes place in dry areas where fresh water is scarce, large-scale artificial irrigation is necessary. Cotton is, together with rice, sugar and wheat, one of the thirstiest of crops. As much as 29,000 litres of water can be required to produce one kilo of cotton! Conventional cotton cultivation has thereby a large influence on the fresh-water cycle and the species diversity supporting it. And people suffer from a serious lack of clean drinking water.

Chemicals dangerous to both the environment and health

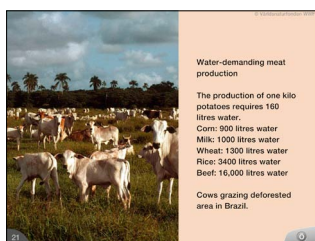
The cultivation of cotton is not only water-demanding, but also requires enormous quantities of agricultural chemicals – to reduce the attack from harmful insects and weeds, and thereby increase profit. Cotton cultivation consumes one-fourth of the world's insecticides, and one-tenth of its herbicides. This often leads to other organisms' and pests' being harmed by the poison. The poisons are spread further in food chains, and in the long run risk disturbing the functions in important ecosystems. Also, people become ill when exposed to the chemicals, in particular cotton workers out in the fields. Headache, illness, fainting and difficult allergies are instances of common complaints.

Examples of the negative consequences of growing cotton

Bomullsproduktion leder alltför ofta till ett ohämmat utnyttjande av vattenresurser och mark som påverkar både människor och de naturliga ekosystemen på flera sätt:

- Pesticides from fields and pollution from factories poison nearby areas and water downstream.
- The degradation of soil through salinisation and erosion.
- Water use contributes to the scarcity of natural ecosystems and their functions.
- Nausea, illnesses and mortality amongst farmers and workers exposed to chemicals.
- Indebted farmers, the presence of whom gives rise to, among other things, child labour and social marginalisation.
- Poor working conditions in the clothing sector.

21



Water-demanding meat production

The production of one kilo potatoes requires 160 litres water.

Corn: 900 litres

Milk: 1000 litres (per litre milk)

Wheat: 1300 litres

Rice: 3400 litres

Beef: 16,000 litres

Swedes consume 17 times more water than what they take from their taps. Households account for barely six per cent of Swede's water use – while thousands of litres go to producing the food we eat and the clothing we wear. Each Swede uses almost 6000 litres of water each day, if you include all the 'virtual' water hidden in products such as food and clothing. This is equivalent to 74 bathtubs, or water for nine to ten thousand loads of laundry. To produce a t-shirt requires up to 7000 litres of water, and a pair of jeans nine to ten thousand.

Many products are manufactured in dry areas in the Third World, e.g. in India, where water is scarce and is subject to hard pressure. To grow a tomato in Morocco requires 13 litres of water, while 140 litres are used to manufacture the various ingredients in a cup of coffee. To manufacture a can of cola requires up to 200 litres water to grow the sugar in it. A cotton shirt from Pakistan or Uzbekistan can soak up 2700 litres water – e.g. from the Indus, for production in the factory.

Sources : Report on Swedes' water-footprint <http://www.wwf.se/source.php/1188196/Background,%20Swedish%20Water%20Footprint.pdf>

Waterfootprint.org <http://www.waterfootprint.org>

Mannautställningen 2004. www.klimathotet.net

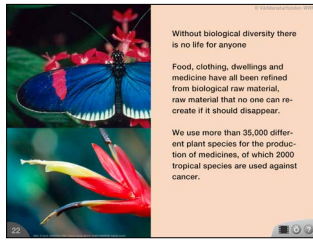
<http://www.wwf.se/press/1188169-varje-svensk-konsumerar-74-badkar-vatten-varje-dag>

Picture: Cows grazing deforested area in the state of Sao Paolo, Brazil.



Read the report about Swedes' water-footprint (see sources). Let the students:

Reflect over the relation between the use of water in Sweden and in the country producing the consumable in question, as well as over the relation between household water and virtual water.



Without biological diversity there is no life for anyone

Food, clothing, dwellings and medicine have all been refined from biological raw material, raw material that no one can re-create if it should disappear.

We use more than 35,000 different plant species for the production of medicines, of which 2000 tropical species are used against cancer.

There are a number of reasons to preserve biological diversity. They can be:

1. Ethical, aesthetic or cultural

Nature, the cultural heritage, and biological diversity are each of value in and of itself.

2. Ecological reasons

The impoverishment of biological diversity increases the vulnerability of the ecosystem.

3. To survive future environmental changes

Nature's ability to adapt to future environmental changes lessens if biological diversity diminishes.

4. Material and economic reasons

The material and economic benefits that we humans receive from ecosystems are called ecosystem services. Humankind's development and well-being depend on ecosystem services, for example those of purifying the air and water, stabilizing the climate, controlling erosion, pollination, and natural pest control, as well as the sea's ability to produce fish and the ecosystem's ability to ameliorate the effect of natural catastrophes.

A precondition for agriculture

If there are too few members of a plant or animal species there is a risk that they will suffer illness or other changes which weaken or completely eliminate the species. Bees constitute for example an important ecosystem service through their pollinating activities. In the United States one of three articles of food is directly or indirectly dependent on bee pollination. The honey bee sustains the cultivation of almonds and other nuts, berries, fruit, and vegetables worth a total of 15 billion dollars a year. Tens of billions of bees have disappeared, and in California the whole of the important almond crop is under threat. Beehives must be imported by truck in order to pollinate. In China they have been forced to pollinate apple trees with cotton swabs. In both Denmark and Sweden the number of bees has also diminished in recent years.

A precondition for getting medicines in the future

A large portion of the medicine used in the industrialised world comes originally from wild plants. Of the more than 220,000 vascular plants we know of today, fewer than five per cent have been investigated as regards possible use in medicine.

Contributes to new industrial products

Almost everything we use in our daily life contains raw materials taken directly from nature or copied from a natural original. It is in nature that we will find new raw materials, especially ones more environmentally friendly than today's, and which make more energy-effective industrial processes possible.

Sources: www.wwf.se/vart-arbete/skog/1130615-skogs fakta
 Swedish Biodiversity Centre, Swedish University of Agricultural Sciences.
 Biologisk Mångfald, Swedish Environmental Protection Board 1990.
 Kerstin Ebbesten, Swedish Board of Agriculture.

Pictures: Butterfly (*Heliconia errata Heliconia*) at 1500 meters, in the nature reserve Mindo-Nambillo in Ecuador. Flowers (*Bromeliaceae*) in the Atlantic rainforest Espirito Santo in Brazil.



The economy and ecosystems, Herman Daly, Professor, University of Maryland.



1. What are the most important reasons for maintaining biological diversity?

2. What does it mean to say that nature is of value in and of itself?

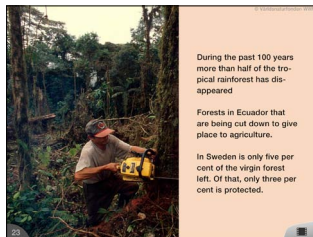


The concept 'ecosystem services' has to do with the ecosystem's use for humans.

Give the students text 4: Material and economic reasons, and text 1: Ethical, aesthetic and cultural reasons. Ask them to reflect over these views of nature.

How does the perspective in point 4 fit with that in point 1, that nature is of value in and of itself?

23



During the past 100 years more than half of the tropical rainforest has disappeared

Forests in Ecuador that are being cut down to give place to agriculture.

In Sweden is only five per cent of the virgin forest left. Of that, only three per cent is protected.

The biological diversity in the woods is exceptional. A whole 90 per cent of land life is in our forests. Of the approximately 1.5 million land species that exist, calculations suggest that one million of them are in the Amazon Basin. On just one hectare there, there can be as many as 400 different species of tree.

In a typical forest in the temperate latitudes, for example in northern Europe, Canada, Japan and large parts of the US, there are 10–15 tree species per hectare. The importance of tropical forests as the biotope of various species cannot be overemphasised. They most likely contain, in terms of the number of known animal and plant species: 65–70 per cent of all vascular plants, 75–90 per cent of the world's insects, 90 per cent of the primates (monkeys and apes), and 50 per cent of the world's bird species, of which, at least 40 per cent of the world's predatory birds.

Forests maintain the balance in the atmosphere, affect the climate, clean the air we breathe, and contribute to the water cycle. They protect against erosion, counteract flooding, and provide us with important medicinal plants. From here we receive food, fuel, timber and raw materials for making pulp. A perpetual source, we'd very much like to believe.

Almost 30 per cent of the land area of the earth is covered by forest. Some 57 per cent of the forests, of which most are tropical, are in Third World countries. Almost half of all trees that are felled are used as raw material in the forest industry. In Sweden is only five per cent of the virgin forest left. Of that, only three per cent is protected. According to botanists and other researchers, at least 15 per cent of the virgin forest would have to be protected to maintain biological diversity.

Sources: *Biologisk Mångfald*, yearbook of the Swedish Environmental Protection Agency, 1990.
<http://www.wwf.se/vrt-arbete/skog/1130615-skogsfakta>
<http://www.skogsstyrelsen.se/episerver4/templates/SNormalPage.aspx?id=20995>
www.wwf.se

Picture: Forest in Ecuador being felled to give place to farming.



Deforestation and consumption, Lester R. Brown, Director, the Earth Policy Institute



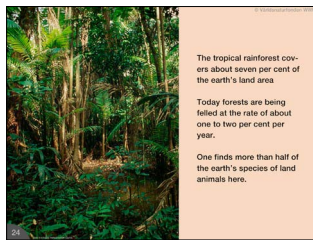
About forestry questions. <http://www.wwf.se/vart-arbete/skog/problem/1130625-problem>

Illegal felling. <http://www.wwf.se/v/skog/problem/illegal-avverkning/1130631-illegal-avverkning-och-virkeshandel>

Forests and climate changes. <http://www.wwf.se/v/skog/problem/klimatf/1130644-skogar-och-klimatforandringer>

Forest fires. <http://www.wwf.se/v/skog/problem/skogsbr/1130650-skogsbrander>

24



The tropical rainforest covers about seven per cent of the earth's land area

Today forests are being felled at the rate of about one to two per cent per year.

One finds more than half of the earth's species of land animals here.

For thousands of the inhabitants of the Amazonas, the fruit of the Amazonian palm (Assai palm, *Euterpe edulis*, see picture) is their main income-producing crop. Land conversion has led to the disappearance of more than 300 million hectares over the past two decades. The 'black' lumber market has a turnover of about one billion dollars each year, and has branches in over 70 countries. The environmental, economic and social consequences are great. Legal forest conversion e.g. for agriculture also has large consequences. There are signs that even in areas where there is free agricultural land, exploiters prefer to fell forests and thereby get access to start-capital before the plantations begin to show a profit. Nature is subjected to high pressure when soya bean plantations, cattle ranches, and oil-palm and sugarcane plantations spread out. The establishment of large-scale plantations leads to people's being displaced from their traditional form of cultivation in the forest area.

Every year millions of hectares of forest are devastated by fires, both intentional and, to an increasing degree, those caused by extreme drought resulting from climate change. The yearly destruction of forests due to fires is just as great as the destruction due to the felling of forests and forest conversion together. Much 'natural value' is lost, and when the trees are burned or felled carbon dioxide is released into the atmosphere, which further contributes to the greenhouse effect. Also, it is uncertain how great the ability of planted trees is to bind carbon dioxide, compared with natural forests. The use of land during the last 20 years has accounted for up to 25 per cent of the total releases of greenhouse gases. According to the IPCC deforestation is the largest contributing factor.

Sources: Hirschberger, 2008.
Uryu et al. 2008.
www.wwf.se
IPCC



Problem forest <http://www.wwf.se/v/skog/problem/1130625-problem>

25



Palm oil has a large influence on people and the environment

The area of palm-oil plantations has tripled in 30 years.

Through increasing international trade we affect the conditions between consumers at other places in the world more and more. Often we're not conscious of the effect our purchases have. Sometimes the effects are positive, for example by their contributing to increased employment and incomes in the Third World. In other cases they are negative, as when the production of the goods we import causes environmental or social problems in the countries from which they are obtained.

Every day we Swedes contribute to the disappearance of one of the world's species-rich areas. This occurs among other ways through the consumption of palm oil, a vegetable oil that has a large influence on the environment and people in the Third World, and is included in many of the products we use every day. The area of palm-oil plantations has tripled in the past 30 years, and is one of the largest forces behind the ravaging of tropical forests in South-East Asia.

Palm oil is present in margarine, ice cream, chips, cakes and cookies, chocolate, make-up, soap, detergent and much else. Often it only says 'vegetable oil' on the package.

Palm-oil products become animal fodder in Sweden

Cows, pigs and chickens all eat products from the oil palm. A considerable quantity of palm kernel expellers, a residue from the extraction of palm kernel oil from the palm-oil plantations in South-East Asia, is exported to Sweden. The palm oil comes from areas which had earlier been tropical rainforests. Forests are considered to be the world's most species-rich ecosystems.

The Swedish importation of palm oil is estimated at 44,000 tons annually. Most of that oil comes from Malaysia and Indonesia. Given the average harvest in Malaysia, this can also be expressed as each Swede's 'borrowing' eleven square metres' land to cover his/her consumption of palm oil.

Sources: www.wwf.se

Picture: Burned rainforest where oil palms are to be planted, Sumatra, Indonesia.



Palm oil – a threat to the rainforest and the orang-utan <http://www.wwf.se/v/ekologiska-fotavtryck/1127730palmolja-ett-hot-mot-regnskogen-och-orangutangen>

What do you mean, palm oil? <http://www.wwf.se/source.php/1119527/wwf-1078459-1.pdf>

European companies poor when it comes to buying sustainable palm oil <http://www.wwf.se/press/pressrum/pressmeddelanden/1268121-europeiska-foretag-daliga-pa-att-kopa-hallbar-palmolja>

Palm oil – where does it come from and where does it go? <http://www.wwf.se/source.php/1116633/wwf-1019744.pdf>



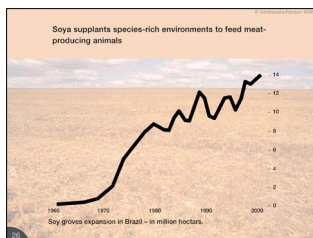
1. Which solutions do you see to the problem that, globally, ever more land is being used to grow animal fodder?

2. Who is responsible for seeing to it that the palm oil you buy won't contribute to the eradication of tropical forests and the driving away of aboriginal peoples? Discuss the roles and responsibilities of local plantation owners, international money lenders, palm oil importers, sellers of products containing palm oil, politicians, consumers and others.

3. Discuss the possible strategies and solutions for protecting the species-rich environments damaged or destroyed when palm-oil plantations and soya plantations are established.

4. Discuss possible strategies and solutions for the aboriginal peoples and poor farmers affected.

26



Soya supplants species-rich environments to feed meat-producing animals

Soya is used as animal food

The greatest portion of the soya imported to Sweden is use as fodder for our cows, pigs and chickens. The portion used directly as food is only a couple of per cent of the total imports. About 385,000 tons of soya are imported for animal fodder each year, which corresponds to almost a boatload every day. Much of the soya comes from Brazil. In terms of the average yield, this means that we Swedes 'borrow' an area of about 200,000 hectares, or around 300,000 football pitches, in Brazil.

This can also be expressed as every Swede 'borrowing' 220 square metres of land to satisfy our domesticated animals' need for fodder.

South America's savannahs are threatened

Expanding soya cultivation has large and long-term effects on the environment in Brazil. When agriculture is developed or expanded in the interior of the country, new sources of income are created; but one of the world's species-richest savannahs, the Cerradon, is threatened with eradication. With the help of large applications of mineral fertiliser and biocides, the savannah's plants and animals are being replaced by monocultures of soya beans. When European cows are fed with soya, the cows produce so much milk that we can't consume all of it ourselves. The over-production is dumped on the world market and ends up, among other places, in Brazil, where it eliminates the small-scale milk farmers.

Sources: www.wwf.se

Picture: Recently sown soya bean field in the Cerradon near Pirenópolis in Brazil. The Cerradon is one of the world's species-richest savannah areas.

 Report about soya <http://www.wwf.se/source.php/1116634/wwf-1019745.pdf>

27



We eat more and more meat

Since 1990 Swedes' consumption of meat and meat products has increased by more than 25 kilos per person and year, now being at somewhat more than 85 kilos.

1980: 63.9 kilos

1990: 60.0 kilos

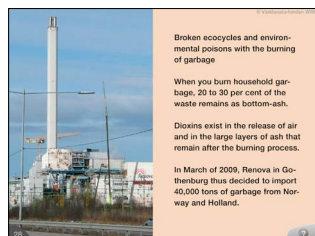
2000: 75.6 kilos

2006: 85.6 kilos

Sources: The Swedish Board of Agriculture.

Picture: Cows in a burned-down rainforest in Conceição, Amazonas, Brazil.

28



Broken ecocycles and environmental poisons with the burning of garbage

When you burn household garbage, 20 to 30 per cent of the waste remains as bottom-ash.

In the ash there are heavy metals, dioxins, PCB and more. A decisive factor as to whether dioxin will be formed in the burning process is the presence of chlorine. In the burning of garbage, chlorine occurs in garbage from households, businesses and industries, particularly in the form of PVC plastics and food remains.

Various burning processes constitute Sweden's largest source of dioxins.

Dioxins exist in the release of air and in the large layers of ash that remain after the burning process.

‘Dioxins’ is a collective name for 210 chlorinated organic compounds. Dioxins are difficult to decompose and are stored in fat and tissue, which leads to an accumulation of organic substances in the food chain. Increased levels can cause cancer and other physiological changes.

A large problem with burning garbage is that recyclable waste is destroyed.

It is very profitable for energy corporations to burn garbage. First, they get paid to get rid of the waste, and then they make money on the heat that is created by the burning. This risks harming renewable alternatives.

Imports garbage for burning

During an economic decline the amount of garbage and household waste tends to diminish. This creates problems for the garbage-burning installations, since they count on a certain amount of garbage to be able to produce district heating.

In March of 2009, Renova in Gothenburg thus decided to import 40,000 tons of garbage from Norway and Holland.

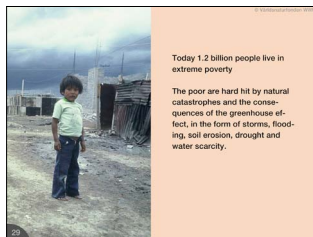
From July 1, 2009, dumping garbage is prohibited in Norway. Despite a planned increase in burning capacity, there will be large quantities of waste that the Norwegians won’t be able to handle themselves. To get through the situation they choose to export the waste. Already today over 300,000 tons of Norwegian waste is burned each year in Swedish plants.

Sources: *Riksrevisionens rapport* RiR 2005:4, Miljörapporten. www.renova.se

Picture: Sävenäs garbage-burning plant in Gothenburg.

? Think about different ways of avoiding the production of waste in society, and how one can take care of the waste that is nevertheless produced in a sustainable way.

29



Today 1.2 billion people live in extreme poverty

The poor are hard hit by natural catastrophes and the consequences of the greenhouse effect, in the form of storms, flooding, soil erosion, drought and water scarcity.

To try to support oneself, a person may go to the nearest megacity, where, in one of the growing slums, he or she will often meet an even worse weekday than at home. From 1950 to 2000 the number of people in the world more than doubled, from 2.5 to just over 6 billion. Today we are 6.7 billion. The industrialised countries, with 20 per cent of the earth’s population, consume 86 per cent of the earth’s resources. This uneven distribution means that the industrial countries use a much greater bio-capacity per inhabitant than does the Third World, and this at the cost of the Third World.

The average person in the United States uses about 60 times as much material as do the inhabitants of poor countries such as Mozambique, and ten times as much as the inhabitants of middle-income countries such as Turkey and Mexico.

Despite widespread poverty, the world has become ever richer as a result of global economic growth. However, a very small portion of this increased wealth has been used to improve the situation for the poor. Rather, the gap between the rich and the poor has only grown. At the same time as natural resources

are being damaged and are diminishing, poor people are forced to get by on less of the ecosystem's services than they had previously. Many thus choose to leave the countryside and move to the city, where they often end up in some slum.

There are many reasons for the existence of poverty and for its being difficult to eradicate. Today Third World countries produce an ever-greater amount of goods and services to meet needs in the industrialised countries. Low wages, a poor work environment, and defective relations with the biological environment seem to be preconditions in the Third World for maintaining levels of consumption in the industrialised countries. In any case, the industrialised countries play an important role when it comes to solving the poverty problem. This challenge creates demands for greater global cooperation in meeting human needs in the Third World. If one fails to do this, increasing migration is a likely result. Ever more poor people are already today finding their way to industrialised countries in their hunt for work and a better life. Since climate change will most likely hit the poor in the Third World harder than the rich in many industrialised countries, this is expected to further increase northward migration.

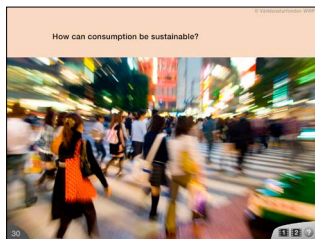
Sources: *Living Planet Report* 2010. www.wwf.se
UNEP, the UN's population fund, UNFPA.
Richard Wilk 'Konsumera mera - dyrköpt lycka', *Formas* 2007.

Picture: Slum in Mexico City.



Gapminder www.gapminder.org

30



How can consumption be sustainable?

In Sweden and other industrialised countries, we've created an economic system and human expectations that are built on the assumption of constantly expanding consumption. If consumption diminishes, the wheels turn more slowly, which leads to the economy – which is measured by the number of kronor changing hands – going poorly. At the same time many citizens of the world stand outside the consumption society we have built up. Many of them are affected as well when our customer goods are produced, partly directly and partly through changes in their local communities and ecosystems.

Even if we could develop a more effective resource and energy use, this wouldn't automatically lead to a sustainable society.

To have a sustainable development we must create a more effective use of resources and, in particular, of energy; but that's not enough. We also have to handle the gains from the effectiveness properly.

What is called the recoil-effect means that efforts that should contribute to our reducing emissions can instead lead to our increasing them. You may, for example, want to acquire a fuel-sparing car that releases less exhaust per kilometre, and gives lower operating costs as well. This means that you will be able to afford to drive longer stretches or that you will be able to spend more money on material consumption. In the same way resource and energy effectiveness in dwellings contribute to our being able to acquire larger houses or buy new furniture that can then 'eat up' the environmental gains that the effectiveness have provided. Shifting to a sustainable society probably means our having to find different and new ways to satisfy our needs without increasing our material consumption.

Sources: 'Rekyleffekten och effektivitetsfällan – att jaga sin egen svans i miljöpolitiken'. Report from the Swedish Environmental Protection Agency: www.naturvardsverket.se/bokhandeln

Picture: Shopping in Tokyo.

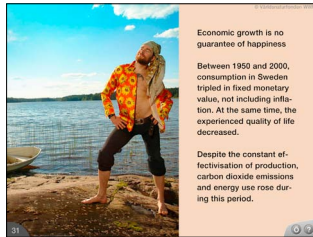


1. Ecosystems and cotton farming, Dr Vandan Shiva, Research Foundation for Science, Technology and Ecology

2. Clothing consumption

? Discuss management instruments that might counteract the recoil-effect.

31



Economic growth is no guarantee of happiness

Between 1950 and 2000, consumption in Sweden tripled in fixed monetary value, not including inflation. At the same time, the experienced quality of life decreased.

Despite the constant effectiveness of production, carbon dioxide emissions and energy use rose during this period.

Many reports show that people feel that the situation has become worse in the last few decades. A good standard of living presupposes a certain form of resources and consumption, but when a particular level has been passed we don't become happier from consuming more. It turns out that what is most important for many people is to have more leisure time, a healthy lifestyle, good social relations and the feeling of leaving a sound world for coming generations.

'Our task is to obtain a pleasure-filled and rich life, and we have to do it in such a way that coming generations can do the same.' Arne Naess, philosopher.

Sources: Database of happiness, docent Christer Sanne (thousands of studies of experienced quality of life). Bäckstrand & Ingelstam 2006 – 'Enough! Global challenges and responsible lifestyles', *What Next*, Volume I, Setting the context. *Development Dialogue* 47, Dag Hammarskjöldsstiftelsen, Uppsala.

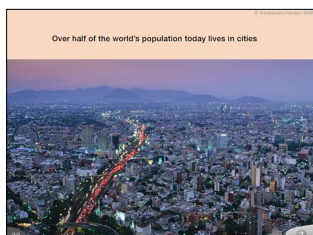
Picture: A Finnish man enjoys the summer by a lake near Tammerfors.

- ? 1. Which alternatives to the growth-based economy can you imagine?
2. Discuss positive and negative examples of how trade between the rich and the poor countries either contributes to or counteracts sustainable development.
3. Which measures and tools do you see as being most important for getting rid of poverty and ill-health in the Third World?
4. Which measures and tools do you see as most important when it comes to reducing the industrialised countries' environmental load and welfare-related illnesses?

ö *Reflect in small groups.*

Can we retain economic growth and at the same time reduce resource use?

32



Over half of the world's population today lives in cities

In the year 1900 we had a handful of large cities with over one million inhabitants. In 2009 we have 441

such cities. In 1950, 732 million people lived in cities; the figure for 2050 is calculated to be 6.4 billion.

The world is fast approaching a situation where, for the first time in the history of humankind, more people live in cities than in the country. Cities and urban communities are responsible for a growing portion of humans' ecological footprint, and presently over 75 per cent of the global release of CO₂. Almost all population growth over the next decades will take place in urban settings.

The rapid increase in global energy use depends on the increasing size of the urban population, which is estimated to grow by more than 50 per cent by 2030. This brings with it increasing demands for urban solutions that can improve living conditions without consuming excessive amounts of natural resources.

In the growing economies, there has to be a global transformation strategy to disengage urbanisation and economic development from the over-exploitation of natural resources. In the Third World this can be done by getting long-term **Low Carbon Action Plans** to diverge from business-as-usual growth, and get cities eventually to begin diminishing their emissions.

The so-called developed countries should adopt **Zero Carbon Action Plans** to achieve zero levels of release by 2050 at the latest. Malmö is an interesting example where they have an action-plan to have become climate-neutral already by 2030.

Sources: 'Plan B 3.0', Lester Brown, Earth Policy Institute 2008.
State of the World 2007, Worldwatch Institute.
<http://www.unfpa.org/publications/detail.cfm?ID=334&filterListType>
http://www.un.org/esa/population/publications/WPP2004/WPP2004_Volume3.htm
<http://www.iea.org/Textbase/nppdf/free/2006/Key2006.pdf>

Picture: Mexico City is the world's second-largest city.



Manning, Robert A., 'The Asian Energy Market: A New Geopolitics?', *Asian Energy Markets Dynamics and Trends*, Abu Dhabi: Emirates Center for Strategic Studies and Research, 2004.

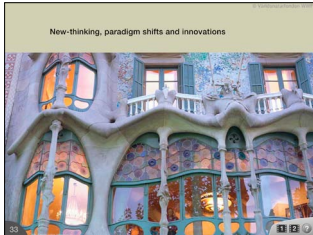


1. What do you think are the main driving forces behind urbanisation?
2. Which advantages/disadvantages do you see with urbanisation when it comes to shrinking the ecological footprint?
3. Discuss which concrete measures are needed in town planning to create a good quality of life and at the same time leave small footprints in the large cities of the world.

Solutions

If you link environmental load and resource use to the various human activities, in certain areas in the industrialised countries the ecological footprints are very big. To a large extent it's a matter of housing, personal transportation, energy use, water, food and the consumption of various items, including clothing. If we can develop smarter ways of meeting human needs in these areas, then we can also contribute to a better life for everyone within the framework of one planet.

33



New thinking, paradigm shifts and innovations

A green economy that protects the planet is within reach

A new McKinsey report shows that a transition to a 'green' global economy can not only protect the planet from the worst effects of climate change, but also take place quickly and at a surprisingly reasonable cost. The McKinsey report, 'Pathways to a Low Carbon Economy', show that global warming can be kept under the critical rise of two degrees, and that we have all the necessary preconditions for succeeding with this. In the study the detailed costs for cutting down the harmful carbon dioxide releases are given, but at the same time it becomes apparent that we must act immediately in order to avoid the worst results of climate change. In 'Pathways to a Low-Carbon Economy', researchers at the McKinsey consultancy firm analyse the possibilities of reducing releases and costs within all sectors, including nuclear power.

WWF believes that the costs of nuclear power have been underestimated. But what is more important is that nuclear power is not an acceptable alternative when you take account of the risks it implies for the spreading of radioactive waste and for plutonium leaks. WWF believes that a reduction of the climate-burdening releases are possible with the help of heating-plant heat, where you simultaneously produce electricity and heat, as well as biomass, better energy efficiency and products with low carbon dioxide releases.

Sources: <http://www.wwf.se/press/1226627-gron-ekonomi-bromsar-klimatforandringen-snabbare-och-billigare>

Picture: The Spanish architect Antonio Gaudí (1852-1926) has turned everything upside down with his spectacular architecture, visible mainly in Barcelona.

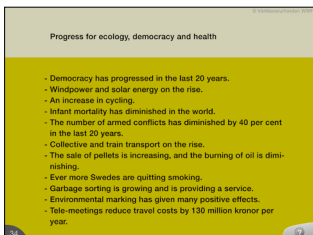


1. Transformative thinking
2. Technical solutions to the climate challenge



Which of the steps towards sustainable development that have been taken in Sweden and in the rest of the world during the past 20 to 30 years do you consider most important?

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Progress for ecology, democracy and health

- Democracy has progressed in the last 20 years.

- Windpower and solar energy on the rise.
- An increase in cycling.
- Infant mortality has diminished in the world.
- The number of armed conflicts has diminished by 40 per cent in the last 20 years.
- Collective and train transport on the rise.
- The sale of pellets is increasing, and the burning of oil is diminishing.
- Ever more Swedes are quitting smoking.
- Garbage sorting is growing and is providing a service.
- Environmental marking has given many positive effects.
- Tele-meetings reduce travel costs by 130 million kronor per year.

The democratic constitution is gaining ground. Between 1988 and 2008, 80 countries around the world began taking important steps towards democracy. The proportion of countries with a free press increased from 23 to 38 per cent between 1984 and 2007 (Bo Angelöw, 'Glädjerapporten', 2008, Nova Futura).

Global windpower capacity increased by 27 per cent between 2006 and 2007. The following list shows the world's largest windpower countries in installed effect, with increases from the previous year in parentheses.

1. Germany 22.2 GW (+1.7 GW)
2. USA 16.8 GW (+5.2 GW)
3. Spain 15.1 GW (+3.5 GW)
4. India 8.0 GW (+1.7 GW)
5. China 6.0 GW (+3.5 GW)
6. Denmark 3.1 GW (+0.003 GW)
7. Italy 2.7 GW (+0.6 GW)
8. France 2.5 GW (+0.9 GW)
9. Great Britain 2.4 GW (+0.4 GW)
10. Portugal 2.2 GW (+0.4 GW) (*Ny Teknik*, 18 Feb. 2008)

The development of windpower increased dramatically during 2008. The United States built more than eight new GW of windpower and have become the world's largest supplier of wind-electricity. China built next most, and more than doubled its capacity. Europe installed as much windpower as the US. Electricity from windpower is the production technique that is growing fastest in the EU (*Energivärlden*, no. 1, 2009). In 2008, 200,000 people were employed in the windpower industry throughout the world (Worldwatch Institute, 10 April 2008).

Between 2002 and 2007 the annual global production of electricity from solar cells increased by 700 per cent (Worldwatch Institute, 8 May 2008). Europe's first commercial power station with concentrated solar power exists in Spain. A few miles west of Seville there are 600 moveable mirrors that capture sunshine to produce electricity. The power station has a top effect of 11 MW, and can produce up to 23 GW per year, enough to supply about 10,000 people with electricity during the same period (*Ny teknik*, March 2007). Throughout the world the addition of solar panels for heat and warm-water production is increasing.

Solar power and windpower have provided altogether 40,000 new jobs in Germany alone (*Veckans Affärer*, 12 March 2009).

The sale of bicycles is record high. Cycling in Stockholm has increased by 60 per cent in ten years, which means an increase of 150,000 cyclists a day ('Har allmänheten minskat sin klimatpåverkan?' *Westander Klimat och Energi* 081127, Swedish Environmental Protection Agency 503-7959-08 Ki). – Infant mortality in the world has decreased. The average lifespan in the world from the beginning of the 20th century to 2006 increased from 30 to 68 years. Bo Angelöw 'Glädjerapporten', 2008, Nova Futura).

The number of armed conflicts in the world has diminished by 40 per cent the past 20 years. In many countries criminality and violence to women is also declining. Equality and women's opportunities increase (Bo Angelöw 'Glädjerapporten', 2008, Nova Futura).

Communal travel in Sweden is increasing. Environmental cars and fuel-stingy cars are selling well.

Train travel increased by nine per cent during 2008 (www.sj.se, GP 5/3-09, 'Har allmänheten minskat sin klimatpåverkan?', Westander Klimat och Energi 081127, Swedish Environmental Protection Agency 503-7959-08 Ki).

Between January 2006 and January 2008 the use of oil for heating individual dwellings decreased by 46 per cent. The use of pellets for heating increased by 39 per cent between 2004 and 2007 ('Har allmänheten minskat sin klimatpåverkan?' Westander Klimat och Energi 081127, Swedish Environmental Protection Agency 503-7959-08 Ki).

In five years, those who smoke daily in Sweden have become 200,000 fewer, as is shown by the public health report of the Swedish Public Health Institute. It is mainly women who quit smoking, even if women still smoke more than men (*Göteborgs Posten*, 17 March 2009).

Material recycling 2007

- Plastic packages 30 per cent
- Paper 73 per cent
- Metal 67 per cent
- Glass 95 per cent
- Newspapers 85 per cent

According to Returpack, who are responsible for the return system, 85 per cent of all cans and bottles are recycled. The amount of recycling when it comes to packaging and newspapers has continued to rise during the 21st century to a record-high 78.2 per cent in 2007. This figure indicates the proportion of what is put on the market and is afterwards collected and recycled. With this result Sweden secures the position of being the absolute world-best.

The recycling of materials, including biological treatment, increased from 34.6 to 48.7 per cent between 1998 and 2007. Since producer responsibility for packaging was introduced it has expanded to hold for most packaging materials. Even tyres, electronics and wood (e.g. packing pallets) have been included in producer responsibility (Förpacknings- och tidningsinsamlingen, FTI, Returpack och Avfall, Sweden).

Environmental marking

So that environmentally conscious customers can choose chlorine-free paper, the Swedish Environmental Protection Agency, together with Friends of the Earth, worked out environmental standards for paper. The paper that made the grade was put on a list. When more and more people began to use the list when buying, the paper producers realised that it was chlorine-free paper that customers wanted. Between 1990 and 1993 the chlorine released from the pulp industry was halved. When the Environmental Protection Agency pointed out the worst battery manufacturer, mercury-free batteries were soon introduced, and a market war broke out. In six months virtually all batteries on the Swedish market were free of mercury. Thanks to the environmental marking of washing detergent, and environmental organisations' persistent work with the question, today between 90 and 100 per cent of laundry detergents on the Swedish market are environmentally marked. This is unique in the world. In the rest of Scandinavia 5 to 15 per cent of laundry detergents are environmentally marked with the swan logo. And not only consumer items affect the environment. Travelling and using electricity have large environmental consequences. Therefore these are marked as well (www.snf.se).

TeliaSonera's release of carbon dioxide sank by 70 per cent, and travel costs were reduced by 130 million kronor per year after the company began focusing on tele-meetings. Their tele-meetings are now increasing by 20 per cent a year. Between 2001 and 2007 air travel was halved, like other travel in TeliaSonera's Swedish activities. Tele-meetings function best when the participants already know each other, so the method is ideal for follow-up meetings. Leadership and clarity have been important in getting personnel to change their behaviour (*Energivärlden*, no. 5, 2008).

Sources: <http://www.ftiab.se/hushall/atervinningen/statistik/riksniva.4.405877db1168b3d892a800093.html>



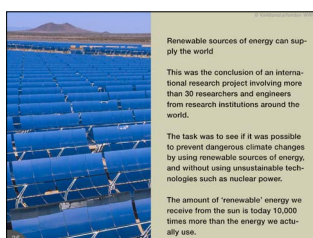
1. Are there any areas in which Sweden has the particular preconditions to lead in the development of a green economy?

2. What competence and what type of new-thinking are needed to take advantage of these preconditions?

3. How can university institutions contribute to raising competence and stimulating innovation?

4. What sort of competence-raising element could for example be included in your own educational programme?

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Renewable sources of energy can supply the world

This was the conclusion of an international research project involving more than 30 researchers and engineers from research institutions around the world.

The task was to see if it was possible to prevent dangerous climate changes by using renewable sources of energy, and without using unsustainable technologies such as nuclear power.

The amount of 'renewable' energy we receive from the sun is today 10,000 times more than the energy we actually use.

It would take only about six per cent of the area of the Sahara to supply the whole world with renewable solar energy.

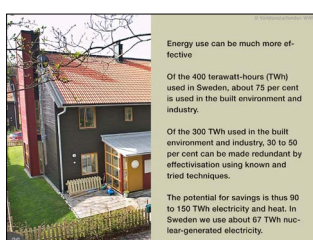
Sources: European Renewable Energy Council (EREC).

The German Aerospace Center (DLR).

'Konsumera mera – dyrköpt lycka', *Formas* 2007, John Holmberg, Physical Resource Theory, Chalmers, and Martin Hedberg, Swedish Meteorological and Hydrological Institute and the Swedish Weather Center.

Picture: One of the largest solar-cell installations for the production of electricity has an effect of 150 Megawatts, and lies in the Mojave Desert in California.

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Energy use can be much more effective

Of the 400 terawatt-hours (TWh) used in Sweden, about 75 per cent is used in the built environment and industry.

Of the 300 TWh used in the built environment and industry, 30 to 50 per cent can be made redundant by effectivisation using known and tried techniques.

The potential for savings is thus 90 to 150 TWh electricity and heat.

In Sweden we use about 67 TWh nuclear-generated electricity.

The potential for effectivisation is great in the built environment. Lighting draws the most household electricity in homes. The opportunities for effectivisation are also large when it comes to heating, pumps, and pressurised air and ventilation in industry and real estate.

Lindås' houses – also called body-heat houses – are built without heating systems. Twenty row houses stand close to an outcrop of bedrock in Lindås, outside Gothenburg. There are another 35 row houses in Landskrona; and in Värnamo there are 40 flats. All of these dwellings have been built without heating

systems. Instead they have extremely thick walls with powerful insulation, large windows facing south that let in a great deal of light, solar cells on the roof, and an effective heat exchanger connected to the ventilation.

The working principle is to minimise heat loss by making the houses almost hermetically tight. When this is done, human heat together with lamps and electrical apparatus, along with the instreaming sunshine, suffice to heat a whole flat, or a row house of 60 to 120 square metres. These dwellings can handle temperatures down to minus five degrees Celcius without the input of extra energy. The houses in Lindås consume 6000 to 8000 kilowatt hours (KWh) per year.

Sources: *Strategi för energieffektiv bebyggelse*, SOU 2004:2.

Swedish Industrial and Energy Supply Measures in a European System Perspective, Dr L Trygg, SWECO.

Björn Trepte and Anders Forsbom, *Miljörapporten*: 'Ekovisioner i praktiken', Alfredson och Jiremark, 2008.
www.idebanken.no.

Picture: The 'passive houses' in Lindås outside Gothenburg.



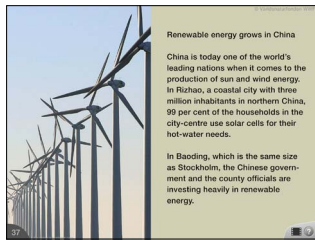
'Halva energianvändningen hela välfärden' http://www.naturskyddsforeningen.se/upload/Foreningsdokument/Rapporter/externa_rapporter/rapport_sweco_halvaenerginhelavalfarden.pdf

'Energieffektivisering på riktigt' http://www.naturskyddsforeningen.se/upload/Foreningsdokument/Rapporter/rapport_energi_energieffektivisering_ny.pdf

www.passivhus.dk

www.europeanpassivehouses.org

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Renewable energy grows in China

China is today one of the world's leading nations when it comes to the production of sun and wind energy. In Rizhao, a coastal city with three million inhabitants in northern China, 99 per cent of the households in the city-centre use solar cells for their hot-water needs.

Traffic signals, street lighting and the lighting of parks are supplied with electricity from solar cells. Over 60,000 greenhouses in the region are heated by solar cells. The city's emphasis on renewable sources has made it one of China's ten cleanest cities when it comes to air quality.

In Baoding, which is the same size as Stockholm, the Chinese government and the county officials are investing heavily in renewable energy.

The windpower company Hui Teng grew 400 per cent during 2006. In the solar-energy company Ying Li, growth was 380 per cent the same year, and their development continues. The goal is that renewable sources of energy will come to constitute the core of the city's economic development. Renewable energy sources stood for 12 per cent of the city's industrially produced sales' value during 2007, a portion expected to increase to 40 per cent by 2050. Apart from Baoding, Shanghai has also become engaged in WWF's project, The Low Carbon City Initiative, which, apart from renewable energy, lays focus on energy-effective buildings, the sales of energy-effective products, and so on.

Sources: *State of the World 2007*, World Watch Institute, *Miljöaktuellt*, no. 1-09, Dennis Pamlin WWF.



Renewable energy in Baoding <http://www.filecentral.se/filecentral/app/sv/pub-fileinfo.html?c=dd4f4b55-1ef9-4565-a757-3be13b970907>



1. What do you consider to speak for or against China's taking a shortcut to a good quality of life for its citizens within the limits of what the planet can tolerate?

2. Is smart technological development sufficient for solving the global problems of environmental

destruction and unjust resource distribution?

3. Discuss the pros and cons of having political and economic contacts with an undemocratic country such as China.

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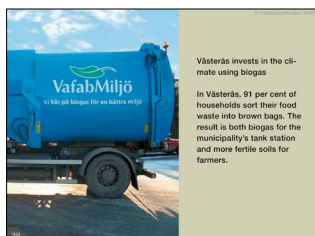
The use of biogas is spreading in China

About 22 million households in the Chinese countryside use biogas, and the number is increasing all the time.

The aim is that 70 million households will be using biogas before 2020. It is estimated that in China there are 800 million farmers who, with the help of biogas, could be energy self-sufficient. One of the companies that has seen the benefit of transforming biomass and manure from cattle to biogas is He Baiyi, which has its main office in Beijing. The company, which was founded in 2000, now has 1000 employees, and during 2007 its turnover lay at close to 450 million kronor. Today the company has about 60 per cent of the market for biogas products in China. The stove in the picture is specially built for biogas, and has a lower pressure than normal. It costs the consumer less than 200 kronor. With the new technique, the standard of living of people in rural areas is raised in a sustainable way. Biogas has even become something of a status symbol.

Sources: www.radio86.se

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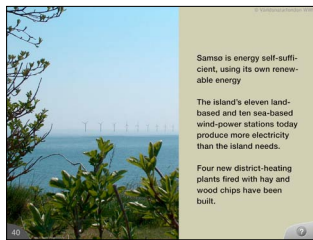
Västerås invests in the climate using biogas

In Västerås, 91 per cent of households sort their food waste into brown bags. The result is both biogas for the municipality's tank station and more fertile soils for farmers.

When you drive a biogas-driven vehicle, all that is produced is carbon dioxide which, coming from animals, has a place in the natural ecological cycle. The effect on the climate is thus significantly lower than if you were to drive a vehicle driven with diesel or petrol. The biogas travels in an eight-kilometre long pipeline to a tank station that is centrally placed in the city. Alongside the pipeline there are a number of car lots, so the potential exists for increasing the number of tanking stations. The gas is used to drive 13 garbage trucks, 40 local buses and about one hundred cars. It is made of ley crops from agriculture as well as food wastes. The residue after the anaerobic digestion process in the biogas plant is used as biological fertiliser by farmers in the region. The quality of the fertiliser is so high that it is accepted by KRAV, Swedish Seal and the Lantmännen Group. The municipality's sewage-cleaning plant contributes biogas to the system.

In Trollhättan, Borås, Örebro, Gävle, Borlänge and Falun biogas is also produced from food waste.

Sources: *Miljöaktuellt* nr 7 -08.



Samsø is energy self-sufficient, using its own renewable energy

When in 1997 Samsø won a competition to be 'Denmark's island for renewable energy', the result was a sustainable development that received international attention. The goal was to achieve complete self-sufficiency with only renewable energy sources by 2008.

In 1998, 8 per cent of the electricity and 15 per cent of the energy for heating came from renewable sources. The electricity goal was reached already in 2000. It is important to reduce the need by 20 to 25 per cent for both electricity and heating.

The island's eleven land-based and ten sea-based wind-power stations today produce more electricity than the island needs. The surplus is sold to the mains on the mainland.

Four new district-heating plants fired with hay and wood chips have been built. District heating covers 70 per cent of the island's heating needs. There are also biofuel furnaces, heat pumps and solar heating plants.

Of the island's 2000 households, 450 have signed on as part owners of the windpower station.

Samsø has also built up its own energy academy that spreads information about renewable energy both within Denmark and internationally.

Picture: Windpower station at sea outside Samsø.



Samsø Havvind www.samsohavvind.dk
 Samsø Energiakademie www.energiakademiet.dk
 Stiftelsen Idébanken www.idebanken.no
 "Ekovisioner i praktiken", Alfredson och Jiremark, 2008.



Discuss how to find sustainable, locally adapted and accepted solutions when it comes to supplying renewable energy in various communities.



Sekem combines social, cultural and ecological development with commercial success

Sekem has created 2000 job openings and free health-care, and receives about 30,000 people at its clinic each year.

Sekem has contributed to forbidding the dusting of cotton plantations, and to seeing to it that 80 per cent of the cotton in the country is ecologically grown; further, the harvests have risen by 30 per cent.

Ibrahim Abouleish wants to do something to break the trend of poverty, create job opportunities, and contribute with agricultural solutions in his homeland, Egypt. In the 1970s he therefore started Sekem, 60 kilometres north-east of Cairo on the border of the Nile delta. Here he has succeeded in turning the desert into a blooming oasis. The business, which has an ecological orientation, includes seven companies and has 2000 collaborators who produce a variety of different products, both for the domestic market and for export. In cooperation with the Egyptian agricultural ministry, Sekem has been able to spread a new sys-

tem for plant protection in cotton plantations. Through cooperation, Sekem has contributed to the forbidding of crop-dusting, and thereby to a reduction in the use of chemical pesticides by over 90 per cent.

Close to 80 per cent of the cotton in the country is today ecologically grown, and the harvests have increased on average by 30 per cent.

Sekem's goal is – by having a comprehensive overview on the individual, society and the environment – to improve living conditions in the region. The means to this end are biodynamic cultivation, research and development, education, and health care. Part of the comprehensive thinking that characterises Sekem is that its activities are to benefit the whole of Egypt and its people. In 2003 Abouleish received The Right Livelihood Award, which is sometimes called the alternative Nobel Prize, and which is given each year in Sweden.

Over and above the 200 Egyptians working on the mother-garden itself, some 2000 are now working at various places in Egypt thanks to Sekem's initiatives. The farm itself has become a cultural centre where it is possible to obtain training for various trades, as well as school education, all connected to Egyptian culture and tradition.

Abouleish was born in Egypt in 1937. During the 1950s he moved to Europe to study chemistry and medicine. He later came to work as head and researcher in pharmacology until 1977.

When he visited Egypt with his family in the seventies he was overwhelmed by the problems with education, analphabetism, over-population, health, unemployment and pollution that he saw. As a result of this experience he started Sekem in 1977. He bought 70 hectares of pure desert from the state. On it were planted, among other things, long rows of quick-growing casuarin trees. In the beginning the trees had to be watered by tanker-truck. Today 100,000 tall trees stand on Sekem's land, which give shade, and protection against the desert winds. Sekem was the first farm in Egypt to develop biodynamic agricultural methods. The methods include reusing all vegetable waste products, and a precondition is that the cultivation will increase biological diversity.

Sekem has no profit requirement, but its activities are financed by the manufacture and sale of natural medicines, vegetables, dairy products, tea, oil, honey, and so on. They sell seeds for sowing, as well as spices and herbs. They have cotton fields; and they produce textiles, clothing and toys.

Social and cultural initiatives

Sekem is therefore something much more than a successful farm. The social and cultural significance of Sekem's initiatives and activities has spread to the Egyptian society. They have schools from kindergarten up to job-training, and they also plan to start a technical university. Sekem supports among others an academy for applied art and science. There's a special work and education programme for children from poor families. For employed adults who lack education, ten per cent of the worktime is set aside for teaching them and their personal development.

Sekem's medical clinic supplies the area's inhabitants with free health care. The clinic receives 30,000 people each year. You can be treated by a general practitioner, gynaecologist, dentist, or eye doctor with many specialities; and you can even have smaller operations performed.

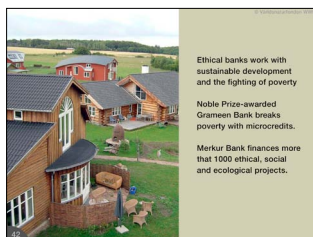
Picture: At Sekem they make, among other things, children's toys out of ecological cotton.



The Right Livelihood Award http://www.rightlivelihood.org/laureates.html?&no_cache=1
Sekem www.sekem.com



1. What are the decisive points in Sekem's success?
2. Ring in likely components in economic, ecological and social sustainability.
3. Is there something that sticks out more, that you believe is more important?



Ethical banks work with sustainable development and the fighting of poverty

In the eco-village Hertha Levefaellesskab, which is near Århus on Jylland, retarded adults live together with normally functioning people. The eco-village has received financial help from Merkur Bank.

Noble Prize-awarded Grameen Bank breaks poverty with microcredits.

Grameen Bank is an organisation in Bangladesh for what is called microfinancing. Grameen gives small loans to poor people without demanding collateral. The system, which started in 1976, is based on the idea that poor people have knowledge that is not being made use of. The bank also accepts deposits, and carries on a number of development-oriented activities, including the operation of textile, telephone and energy companies. The founder of the organisation, Muhammad Yunus, received the Nobel Peace Prize in 2006 for 'his work to create economic and social development from the bottom up. True peace cannot be created without large groups of people finding ways to break out of poverty. Microcredits are such a way.'

Since the bank began, it has loaned more than 6 billion dollars, helping lift people out of poverty. It is mainly women that are turned to, and they constitute over 90 per cent of the borrowers. Through the loans the women have strengthened their position in Bangladesh. The goal is to turn the vicious circle of 'low income, low savings, and low investments' to a good circle of 'low income, small loans, investments, more income, more saving, more investment and more income'.

Merkur Bank finances more than 1000 ethical, social and ecological projects.

Merkur Andelskasse, with its main office in Copenhagen, works mainly with the financing of ecological, social, ethical and cultural projects. Over and above the offers you can receive from any bank, Merkur has a number of accounts all of which support projects for sustainable development. One example is the Save-the-Children account, where the organisation receives 1.5 per cent of what is on the account every year. They also provide more environmentally-friendly loans. The bank lowers the interest rate on car loans the further the cars can drive per litre fuel, and every time the bank gets a new customer recommended by an existing customer, they buy 100 square metres of rainforest in Latin America.

Over the years the bank has financed more than 1000 projects for the public good. Merkur, which was founded in 1982, finances projects in ecological and biodynamic agriculture, renewable energy, sustainable production, ecological construction, and just and environmentally friendly trade. The social projects that the bank supports include eco-villages and condominium associations that focus on new living, and building and ownership forms with alternative energy solutions and resource-saving measures. Energy is also put into homes for retarded children and adults, as well as institutions for socially maladapted children and youth. The cultural projects can for example be free schools, preschools, post-secondary institutions, seminars, local culture centres, theatres and music events. Together with their customers, Merkur tries to take responsibility for community development. They are happy to support projects that give long-term effects.

Sources: www.smallplanetfund.org

'Att låna från Grameen Bank: Hur fattigdom, sårbarhet och samhällsstatus förändrats för fyra kvinnor i Bangladesh', Hansson & Shahiduz, Economics, Uppsala University, 2004.

'Ekovisioner i praktiken', Alfredson and Jiremark, 2008.

www.idebanken.no

Picture: The Hertha Levefaellesskab eco-village, Denmark.

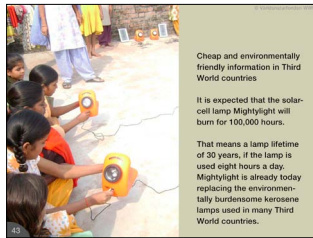


Merkurbank www.merkurbank.dk

Grameen Bank www.grameen-info.org

JAK Medlemsbank www.jak.se

Ekobanken www.ekobanken.se



Cheap and environmentally friendly information in Third World countries

It is expected that the solar-cell lamp MightyLight will burn for 100,000 hours.

That means a lamp lifetime of 30 years, if the lamp is used eight hours a day. MightyLight is already today replacing the environmentally burdensome kerosene lamps used in many Third World countries.

Kerosene lamps are today used for obtaining light by 1.6 billion people, or 20 per cent of the population of the world. In India alone, 83 million people are dependent on these lamps. Kerosene is a fossil fuel whose burning releases large quantities of carbon dioxide. And the lamps are ineffective. MightyLight is a multifunctional solar-cell lamp with what is called LED-technology, and is portable and flexible. It can be hung from the ceiling or put on a table. It is unbreakable, water resistant, environmentally friendly and can be used as room lighting, reading lamp or spotlight. It gives about 200 times better light than a kerosene lamp and about 50 times better light than a conventional light bulb. With accessories it costs about 25 American dollars, and investments are calculated to be paid back in twelve months. MightyLight, sold by the Indian company Cosmos Ignite Innovations, is used in India, Afghanistan, Pakistan, Cambodia, Nigeria, Kenya, Rwanda, Panama, Guyana and Columbia.



Cosmos Ignite Innovations www.cosmosignite.com

'Indian Companies with Solutions that the World Needs – Sustainability as a Driver for Innovation and Profit', Sachin Joshi et al., 2008. WWF och CII-ITC CESD http://www.wwfindia.org/news_facts/?2980.



Swedish ecological clothing favours local development in the Third World

The Ecocotton Company of Borås has helped more than 250 Peruvian cotton growers change over to an economically, socially and ecologically sustainable cotton production.

The company assumes responsibility for the production from seed to finished clothing, and the farmers who produce the cotton earn on average 15 per cent more than conventional cotton growers in Peru.

The work started as an experiment in 1986 in cooperation with environmental organisations and the local farmers. The experiment was financed by the companies themselves the first years, and the farmers received full payment even if the harvests weren't very large in the beginning. Today the harvests are as large or larger than before the changeover to ecological production. Over the years the family business has supported the farmers with technical and agronomic support, education, fertiliser and pesticides. The cotton is KRAV-certified, which means that the whole chain from production to preparation and sale is checked. The turnover in the Ecocotton Company varies around 15 million kronor. The sister company in Peru – Bergman, Rivera SAC – turned over about 15 million kronor in 2008. Today the company also sells finished products for export to the US. Five people are employed at the Borås office, and in their own shop in Borås; in Peru another ten. Beyond that, the Ecocotton Company employs hundreds of people when it comes to weaving yarn and making textiles and different articles of clothing for their own collection. Apart from Sweden, the company sells mostly to the US, Japan, Canada, Greece, Spain, Germany, Denmark, Finland and Peru, and the products mainly sold are yarn, textiles, home-textiles, underclothes, children's clothes, shirts and jerseys. The building in which the shop is located was built by the Bergman family according to ecological principles, and it also houses a restaurant run on those same principles.

The company has received much attention and has received many prizes, most recently the environmental prize in Sjuhärad for 2008.

Dem Collective unite ecology, ethics and thought through design.

Dem Collective was founded in 2004 by Annika Axelsson and Karin Stenmar as a reaction to the then-current way of producing clothes. The idea was to show that it is possible to unite ecology, ethics, quality and thought-through design. Annika and Karin do not want those making their clothes to have workweeks of over 80 hours for a wage of a few kronor an hour. Neither do they want their clothes to be made from genetically modified cotton and with chemicals that are dangerous to one's health and the environment. Today Dem Collective shows that it's quite possible to run a clothing company with a profit without misusing either people or the environment. The company has three employees in Gothenburg and 17 on Sri Lanka. They have twelve different products and their turnover in 2008 was three million kronor. Transparency is one way of creating respect and understanding.

Normally the process behind an article's way from the cotton fields to the customer is completely invisible. Annika Axelsson and Karin Stenmar believe in transparency in all the steps in the process, and also believe that it is important to understand how the articles we use affect the environment the raw material is taken from, and the people who make the articles. The cotton comes from Agrocél Industries Ltd in northern India. Agrocél is certified by both Control Union Certifiers and Fairtrade. This guarantees that the cotton is 100 per cent ecological and that the work environment on the plantations is certified according to the Fairtrade production rules. The company's clothing is manufactured completely in their own factory in Kadawathaa, outside Sri Lanka's capital Colombo. Together with the Siyath Foundation, which works fighting poverty, they run another factory in Peraliya in southern Sri Lanka.

Looked at globally, cotton is a large crop. It is grown in 80 countries on a total of 35 million hectares, and employs an estimated 300 million people, mainly in the Third World. For this reason WWF initiated the Better Cotton Initiative, BCI, to stimulate cotton production to step by step become more responsible to both people and the environment. The aim is to leave a large impression on the global level. The BCI involves the whole chain of actors in supporting and developing the initiative. The BCI focuses on strengthening the growers' ability to use methods that minimise the environmental effects of plant protection, use water more effectively, conserve the soil and the natural environment, and contribute to good fibre quality, better working conditions and better market paths.

Sources: www.bettercotton.org

Picture: Cotton harvest in Canete valley, about 150 kilometres south of Lima, Peru.



dem collective www.demcollective.com

Siyath Foundation www.siyath.org

Better Cotton Initiative www.bettercotton.org

Cotton – a water-thirsty crop <http://www.wwf.se/vart-arbete/sotvattenvatmarker/problem/1128210-bomull-1a-sida>



Discuss what is needed when it comes to business to be able to unite profitability with morality and consideration for the environment.



Vision and reflection

This exercise can be done in a variety of ways. The idea is to let the students use both their creative-presentation ability and reflection. Brainstorming in small groups together with individual reflection is one way. To make a collage or create other sorts of pictures supports innovations as well. But the visions have to be anchored in more reality-based thoughts about the future – for that reason the need to close the exercise with reflection.

1. How do you think world trade will develop in the future?

2. What do you see as possible or desirable future changes?

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Dutch families reduced their burden on the environment and improved the quality of their lives

In Holland a few years ago a life-style experiment was carried out where the conclusion drawn was that a future low-consumption society needn't lessen one's happiness. In the study, which was initiated by the Dutch department of the environment, 14 families participated over two years.

By consuming less and differently the participating families succeeded in drastically diminishing both their dependence on their surroundings and their release of greenhouse gases.

The result was that they spent money more on art, the theatre, massage, cleaning help, expensive clothes, and so on.

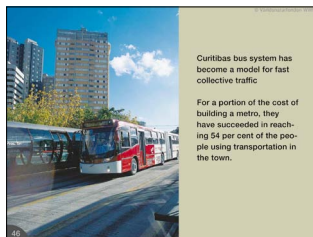
They experienced a better quality of life with the new way of consuming. The company of other people, which doesn't demand the extraction of natural resources, is perhaps highly valued, but it doesn't have a money value.

Sources: 'Holland's Department of the Environment', *Sveriges Natur*, no. 6, 1999.



Lösningar <http://www.wwf.se/v/klimat/l/1124285-klimat-losningar>

46



Curitiba bus system has become a model for fast collective traffic

The bus system Curitiba opened in southern Brazil already in 1974. Since then, it has gradually expanded.

For a portion of the cost of building a metro, they have succeeded in reaching 54 per cent of the people using transportation in the town.

Curitiba, with its 2.2 million inhabitants, can offer a modern transport system. Its successes depend on farsighted work with community planning in the city, where comfort, punctuality and speed have been some of the key words. On some stretches, and at certain times of the day, the buses go as often as every 90 seconds. The passengers wait on special bus-stop platforms that are on the same level as the floors of the buses, and pay for their ticket on the platform before they board. The bus system includes special bus lanes, which makes it possible to maintain speed and see to it that the buses don't get into traffic jams.

Compared with other Brazilian cities, the inhabitants of Curitiba use 30 per cent less fuel per capita.

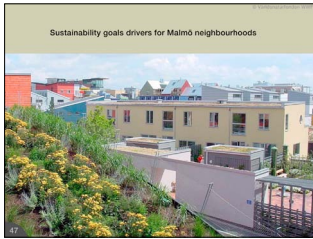
In recent years the system has obtained followers in many cities such as Bogotá in Colombia, Quito in Bolivia, Jakarta in Indonesia, Beijing in China, Seoul in South Korea, Brisbane in Australia, Ottawa in Canada and Rouen in France. In Bogotá they have further developed the idea, and have been able to increase both the average speed and the number of passengers transported each hour. The system has been improved by rebuilding the streets, with the creation of a number of parallel bus-stop platforms and separate walking and cycle paths.

Air pollution and effect on the climate have diminished, as have traffic accidents along the bus corridors.

Pedestrian and cycle traffic have increased, and the quality of life in the city has improved.

Sources: *State of the World 2007*, Earthscan. *Urban Habitat/Race Poverty and the Environment*, REDI, Oakland, California, Trafik, Jan. 1995.

47



Sustainability goals drivers for Malmö neighbourhoods

The western dock area is a new neighbourhood built on the old shipyard in Malmö. Parts of the neighbourhood were finished at the time of the housing exhibition Bo01 in 2001, and the neighbourhood as a whole is called the City of the Future. In construction, the use of substances dangerous to health or the environment has been avoided; and the building materials should be reusable at demolition. The western dock's new buildings are supplied with locally produced energy from renewable sources. The energy used in the area is generated either in the area itself or nearby. Sun, wind and water constitute the basis of the production of energy, together with energy from waste. A large part of the heat energy used in the area is extracted from the sea, and from an aquifer system – a natural water reservoir in the bedrock – with the help of a heat pump. Solar panels and solar cells are placed mainly on the roofs and walls of private houses. Most of the electricity is generated by windpower, and some by solar cells. Biogas is reclaimed through being extracted from the organic waste from the area's waste mills, and after cleaning becomes energy-rich biogas that doesn't contribute to the greenhouse effect. The demand for 100 per cent renewable energy means that there must be a balance between the production and use of electricity and heat on a yearly basis. All the energy used in the area has, at some time, been produced there. The new mains and the neighbourhood's district-heating network have been connected to Malmö's system in order to bridge the interval between the energy's production and use, without the need of special equipment to store the energy. This system is used as an accumulator and reserve-access. Effective energy use is necessary to the goal of only using locally produced renewable energy. The buildings in the neighbourhood are formed so as to minimise the need for heating and electricity. A rich and varied greenery characterises parks, yards around dwellings, streets and squares in the West Dock. The houses are close together to use the land effectively. Large trees together with the plants in the ponds form green oases among the streets and squares. Even wild plants and animals are to be found in the area's climbing plants, butterfly gardens and corners of gardens. In the neighbourhood's parks nature-simulating biotopes have been planted in the form of meadows, oak groves, beech groves and alder swamps. To get as much greenery as possible, a system is applied that has what is called a green-area factor. The areas where the ground has been made hard, i.e. no longer lets rainwater seep in or has plant life, must be compensated for with green areas on the same piece of land. Examples of the sorts of green area that give points are flowerbeds, greenery on walls (hanging or climbing plants), green roofs (mainly moss-sedum mats, ponds, and large trees or bushes).

To stimulate sustainable transport, buses are frequent, and there are numerous car-free streets and a well-developed network of pedestrian and cycle paths. The neighbourhood today contains somewhat more than 3000 people, and expansion plans speak of closer to 13,000 in ten years. In order to realise the high environmental ambitions, a quality programme has been drawn up for those participating in the designing and construction processes. The quality programme is a cooperative project between the construction firms and the city of Malmö, and is directly connected to agreements about land opening.

In the 1950s area Augustenborg, with its 3300 inhabitants, renewal with an ecological signature has been emphasised. The community members have been engaged in the process from idea to action. Augustenborg has been mentioned disparagingly for its having recurrent problems with flooding due to an improperly dimensioned surface-water system, and for having very hard surfaces. By getting the people living there engaged in different sub-projects, an interest in and engagement with sustainability questions have been created in the area. One of the sub-projects has to do with surface-water treatment. Today 70 per cent of the rainwater is taken care of in a local system which includes green roofs, canals and ponds. Ten thousand square metres of sedum roof adorns the office buildings and factories in the area. The runoff-water system has also given rise to local business.

Malmö is the municipality in Sweden that has devoted most attention to solar energy, with solar installations being located at schools, old-people's homes, outdoor pools, museums and industrial buildings. In the spring of 2010 a unique sun-driven Stirlingmotor was installed in Sege Park, where Sweden's largest solar-cell plant is already located. The spectacular sun-wings consist of 1250 square metres of solar cells, and have a top effect of 166 KW. In the sea outside Malmö is the world's third largest sea-based wind-park, Lillgrund. Lillgrund is Sweden's largest windpower project to date. The park consists of 48 wind-power aggregates that produce 0.33 TWh electricity per year. This corresponds to household electricity for 60,000 homes. A new project in the city is urban windpower – small windpower aggregates which can be placed in a built-up environment. There are also plans for two large windpower plants in the harbour area. Windpower is also on the way to becoming an important business in Malmö, involving an increasing number of companies.

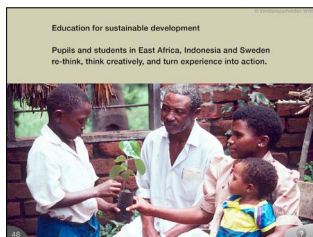
Sources: www.malmo.se/miljo

Picture: The West Docks are completely self-sufficient with renewable energy.



Malmö stad - Sustainable City Development www.malmo.se/sustainablecity

48



Education for sustainable development

Pupils and students in East Africa, Indonesia and Sweden re-think, think creatively, and turn experience into action.

Sustainable development – and teaching about sustainable development – have to do with conquering the abilities, valuations and knowledge that contribute to a sustainable society. The knowledge one develops consists of various personal abilities that can be used in both individual and collective contexts to contribute to taking more conscious and reflective decisions in an ever more complex and changing world. This is a social process we call sustainable development, without a well-delineated endpoint.

Examples of important abilities are those of being able to connect ecological sustainability to economic and social perspectives, and to develop a comprehensive view; and of being able to critically analyse conflicts of interest, solve problems, work democratically outwardly, and have influence. Here the education sector has an extremely important role to play in order for us to be better prepared to meet different challenges and contribute to a more sustainable social development. Also informal and non-formal teaching that can take place at our workplaces – through adult education or via the media – is of great significance.

WWF carries on an education programme in the runoff area of Lake Victoria, in order to increase awareness and the capacity to find more sustainable solutions when it comes to water, forest and agricultural problems. A large part of the population is young, and therefore it is extra important to build up knowledge about sustainable development in the schools. The project, carried on in Kenya, Tanzania and Uganda, is also directed to adults. It mainly has to do with continuing education, the production of material, support to local initiatives for more sustainable solutions, and the creation of networks in the three relevant countries. The programme covers the continual education of all personnel at chosen schools and teachers of continuing teacher education at chosen teaching schools, and teaching key people in chosen villages. At the schools it's a matter of taking a synthetic view of each school's activities, and seeing to it that everyone is involved. This concerns everything from the school's teaching policy, the pupils' influence, cooperation with the surrounding community, taking care of the school's resources, and follow-up. The teachers try to develop an attitude where sustainable development becomes a naturally integrated perspective. Instead of the dominant 'intravenous' teaching method, methods are used where the pupils are focused on and are active, and can better develop their abilities.

The aim is to improve the methods of teaching sustainable development and of building up the ability to find and develop alternative methods that improve living conditions and are at the same time kind to the

environment. The reason for the project is that Lake Victoria is heavily burdened. The population in the area has increased, the number of fish species has been reduced by 80 per cent, and the pressure on the fishing industry is hard.

Deforestation has led to the loss of 70 per cent of the forests in the area, and there are also problems with soil erosion. For many years they have struggled with water hyacinths, a foreign species that has spread over the water surface, and over-fertilising has become a big problem. To find solutions to the problems with the lake you have to stand on dry land.

Participating schools, teachers' colleges and villages are developing knowledge, abilities and values, and are engaged in: ecological cultivation, the creation of fishponds, tree-planting, agroforestry, putting up erosion hinders, using energy-effective ovens, health questions, handicrafts, sustainable water treatment, and the restoration of wetlands. They are acting together to spread information to other schools and villages; and many others have become inspired and carried out changes in their schools and villages.

WWF carries on similar programmes at many places in the world, such as in India, Mongolia, Indonesia and Sweden. In Sweden the WWF cooperates with nine primary and secondary schools and Mälardalen University to develop inspiring examples of how one can orient the whole school around teaching for sustainable development. In cooperation with the city of Malmö, which is focusing strongly on education for sustainable development, ways are being sought to make a deeper impression. These include those being tried at Malmö University, where students participate in sustainable-city work and contribute with knowledge and innovations. Among other things, as a part of their education, design students get to help the city of Malmö to map agents, problems and possibilities when it comes to travelling's effect on the climate. The students also, with the help of focus groups, develop and test prototypes of solutions that teach Malmö inhabitants more sustainable travelling habits.

Sources: <http://www.wwf.se/vart-arbete/var-arbetar-wwf/afrika/1141848-lake-victoria-environmental-education-programme> "



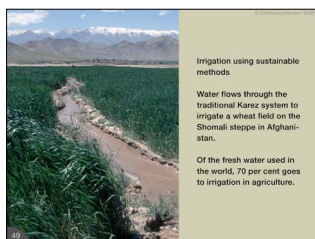
ESD Sverige www.esdsverige.se

Model schools <http://www.wwf.se/utbildning/l/skolutveckling/modellskolor/1165195-modellskolor>



What can universities and colleges in Sweden learn from this type of education for sustainable development?

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Irrigation using sustainable methods

Water flows through the traditional Karez system to irrigate a wheat field on the Shomali steppe in Afghanistan.

Of the fresh water used in the world, 70 per cent goes to irrigation in agriculture.

Irrigation using sustainable methods

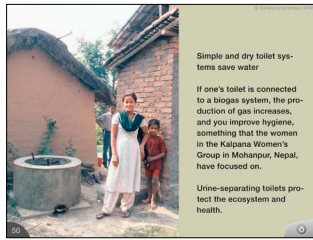
Water flows through the traditional Karez system to irrigate a wheat field on the Shomali steppe in Afghanistan.

The Karez system, which is common in rural areas, is a sustainable groundwater-using method that has existed for hundreds of years. The complex system consists of kilometre-long vertical shafts and horizontal tunnels; and it brings groundwater to the surface completely without using mechanical equipment.

Of the fresh water used in the world, 70 per cent goes to irrigation in agriculture.

In cooperation with Mexican farmers and the local water authority, WWF has shown that it is possible to effectivise the irrigation system in the Mexican Chihuahua Desert. There is a scarcity of water in the area, and the people there have been able to reduce their use of water by a whole 40 per cent with the help of the new irrigation system, which means the construction of canals and the use of high-pressure sprinklers. In some areas the harvest has increased by 50 per cent.

Sources: Kenneth Walve 'Gränser för maten, vattnet och oljan 2006', *WWF Eko*, no. 3, 2006.



Simple and dry toilet systems save water

If one's toilet is connected to a biogas system, the production of gas increases, and you improve hygiene, something that the women in the Kalpana Women's Group in Mohanpur, Nepal, have focused on.

An Indian family of five people produces 250 litres of excrement in one year. If they use a water toilet it means that they pollute 150,000 litres of water per year to flush away faeces. If they choose to use a toilet where the faeces is instead composted at the site, 90 per cent of its volume disappears during the composting process, and no water at all is used. If this is complemented with urine separation, you get a nutrient-rich fertiliser for agriculture.

Urine-separating toilets protect the ecosystem and health.

Better handling of human excrement protects drinking water and the ecosystem. An ecological sanitation system where urine and faeces are sorted means that important nutrients in the form of nitrogen and phosphorus can be of use in agriculture in a non-compound form. In a conventional sewer system nutrients are mixed together with waste and environmental poisons, and the residue is difficult to use in food production. In the Third World it is also common that there is no sewer system. Close to 2.6 billion people today lack access to sanitation.

An ecologically based sewer system, where the nutrients are taken care of at the source, gives larger harvests, strengthens the soil's fertility, and reduces the general environmental burden through reduced waste emissions and lower energy use. According to the World Health Organisation (WHO), every dollar invested in sanitation gives ten dollars back in the form of reduced sick-leave and increased longevity.

Sources: 'Plan B 3.0: Mobilizing to Save Civilization', Lester Brown, Stockholm Environment Institute, WHO.



Seek more information on the Web

Give some examples of where education for sustainable development seems to have supported concrete changes towards increased sustainability. What do you think the most important success factors are?



Successful food businesses take responsibility for the whole

Saltå Mill in Järna, outside Södertälje, Sweden, makes and sells products such as stone-ground flour, bread, cereal, raisins, dried apricots, pasta lentils, beans, peas, juices, and so on. The company uses no preservatives or other chemical supplements in their products. The whole operation is built on an ecological and biodynamic overall view.

Saltå Mill wants to contribute something positive to society and at the same time run a profitable company. Ecocycle thinking has led to their heating their dwellings from a special furnace that burns oat shells, which are production residue. And the company's vehicles are driven by renewable fuels such as biogas, RME (biodiesel made from rapeseed) or ethanol. Between 2002 and 2007 Saltå Mill substantially increased its sales, its range of products, and its profitability. Turnover increased by 250 per cent, and dur-

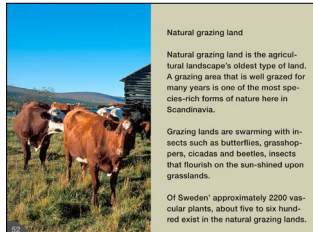
ing 2008 the company's sales increased by another 35 per cent; turnover that year was 135 million kronor.

Sources: "Ekovisioner i praktiken" Alfredson och Jiremark 2008
www.idebanken.no
www.ekoweb.nu



Saltå Mill www.saltakvarn.se

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Natural grazing land

Natural grazing land is the agricultural landscape's oldest type of land. A grazing area that is well grazed for many years is one of the most species-rich forms of nature here in Scandinavia.

Grazing lands are swarming with insects such as butterflies, grasshoppers, cicadas and beetles, insects that flourish on the sun-shined upon grasslands.

Of Sweden' approximately 2200 vascular plants, about five to six hundred exist in the natural grazing lands.

To save the most important natural grazing lands, the WWF has been working for many years with rural development built on staples agriculture. The basic idea is to produce meat from animals that have grazed on natural grazing land. This meat is marketed as 'naturally grazed', and has a greater amount of marbling than normal meat. Production of naturally-grazed meat often takes place with trade and/or small-scale tourism as complementary income sources in areas where it is difficult to survive only on farming.

Background

Until about one hundred years ago there were large unified areas where cows, oxen, horses, sheep and goats grazed from early in the spring until late fall. Winter fodder was collected from natural hay meadows – from which comes the saying 'the meadow is the mother of the field'.

Meadows and natural grazing land have constantly lost significance; instead fodder is grown, and grazing lands have become overgrown with weeds or have been planted with forest. The transition to cattle-free operation, with ever more concentrated animal handling, has led to a further diminution and dividing up of earlier cohering areas. Today only a fragment remains of the natural grazing-lands and meadows that once existed in our nation.

Natural grazing land is among the most species-rich environments in Sweden, and many of the species that flourish there are red-listed, i.e. their future is unsure or threatened. Both the natural grazing-land and the number of grazing animals out on the land has diminished greatly during the 20th century.

Biological diversity

Natural grazing-land is very valuable for biological diversity in the agricultural landscape. The grazing, tramping, and droppings of animals are important preconditions for species-richness in these areas. Custom or tradition (care/use) creates a situation where no species is allowed to dominate; rather, many species cooperate on a small surface. If the grazing tradition declines or ceases, and the land becomes infested with bush and saplings, the number of species will successively diminish.

That natural grazing-areas have such high biological value depends on their containing many different life-environments for plants and animals. It can be a matter of dry, sandy environments, moist clay, small bodies of water, thick old trees, lopped trees, dead wood, blooming bushes, herbs and grass, as well as a tight sward. Depending on the different preconditions of type of earth, bedrock, geographic situation, care

and vegetation etc., natural grazing-land can be divided up into beach meadows, rivers, heaths, juniper hills, oak and other groves as well as grazed forest (forest-grazing).

Natural grazing-lands and other grasslands also leak less plant nutrients (phosphorus and nitrogen) to water courses, lakes and the sea than does tilled land. No pesticides are used and no fertiliser other than what the animals themselves produce is applied. By letting the animals graze in natural grazing-lands the 'over fertilising' of the sea can be reduced.

Sources: Natural grazing-lands <http://www.wwf.se/v/jordbrukslandskap/naturbete-och-naturbetesk/1129668-naturbetesmarker-intro>



Natural pasturage and the tending of natural pasturage. <http://www.wwf.se/v/jordbrukslandskap/naturbete-och-naturbetesk/1129709-naturbete-startsida>

Agricultural landscape. <http://www.wwf.se/v/jordbrukslandskap/1122999-kulturlandskapet>

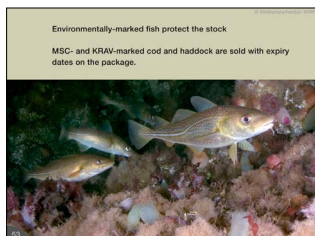
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Naturbeteskött i Svartådalen, (2006). <http://www.wwf.se/source.php/1120805/Svartådalen%20folder.pdf>.

Sustainably produced food. <http://www.wwf.se/naturvaktarna/show.php?id=1017305>

Eat S.M.A.R.T. <http://www.folkhalsoguiden.se/Informationsmaterial.aspx?id=1068>

53



Environmentally-marked fish protect the stock

MSC- and KRAV-marked cod and haddock are sold with expiry dates on the package.

Domstein Enghav, between Smögen and Kungshamn, sells and processes MSC- and KRAV-caught cod and haddock. The company is part-owner in the certified boats that fish safe stocks in Barents' Sea. Between January and April the boats leave Lofoten in Norway to catch cod that wander down from Barents' Sea. Only lines and hooks suitable for catching large fish are used. The bait, which consists of fish entrails, is also suitable for attracting these fish. It is what is termed a passive fishing method that gives lower energy use and smaller bycatches. In the fall the same boats go to sea after haddock. The fish is filleted and frozen directly in local plants in the Vesterålen group of islands, which is important when it comes to guaranteeing good quality. Today there are 25 KRAV-certified boats in the fishing fleet that Enghav works with.

Ten years ago MSC – Marine Stewardship Council, an independent certifying system for more responsible fishing – was formed to come to grips with the problem of overfishing. The Council today includes more than 2000 products from 42 certified fisheries that carry the MSC logo, and a further 100 who are striving to become certified.



Sustainable fishing. <http://www.wwf.se/v/hav-kust/l/uth/1133496-uthalligt-fiske>.

Environmental marking – MSC. <http://www.wwf.se/v/hav-kust/l/milj/1133529-miljomarkning-msc>.

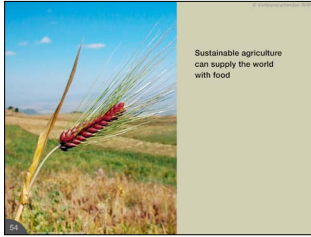
Fish for supper? <http://www.wwf.se/v/hav-kust/l/fisk-till-middag/1133536-fisk-till-middag>.

The diversity of the sea. <http://www.wwf.se/v/hav-kust/havets-m/1133341-havets-mangfald>.

Enghav www.enghav.se

WWF www.panda.org

'Silent Sea', Isabella Lövin, Ordfront förlag, 2007.



Sustainable agriculture can supply the world with food

The picture was taken in the Tigray region of northern Ethiopia. In this poor region they have succeeded in changing a situation of reduced harvests and powerful soil erosion. The project, mainly directed at small-plot farmers, has resulted in increased productivity, larger harvests, high groundwater levels, better soil fertility, less vulnerability to drought, increased incomes and good opportunities for women to earn a living. Here poor small-plot farmers, researchers, local advice-givers and agricultural experts together with environmental organisations have worked out an ecological system of cultivation based on local investment goods, biological diversity and other ecosystem services.

Sweden

The agricultural landscape, which makes up about ten per cent of Sweden's area, went through very large changes during the 20th century. From small-scale farming with natural grazing-lands, agriculture has been transformed to today's large-scale companies with few crops and farming methods. This has meant that the agricultural landscape's species-rich types of nature – meadows and pastures – have been markedly reduced. And this in turn means that many species previously common in the open landscape are now diminishing in numbers, or are on the way to disappearing.

In 2005 it was calculated that about 1700 of agricultural land's species are red-listed (i.e. risk disappearing from Sweden). Among these are mammals, birds, butterflies and other insects, vascular plants, lichens and mushrooms.

To maintain the diversity of animals, plants and the open agricultural landscape is today one of nature conservation's most important tasks, and in performing this task farmers and their animals have an extremely important role to play. You could say that farmers today have a double duty – *to produce both food and a species-rich landscape*.

Europe: The EU's Common Agricultural Policy

The EU's Common Agricultural Policy (CAP) was instituted at the beginning of the 1960s. The EU has thus a common agricultural-financing policy, a common market and common prices; and agricultural products from the EU have right of precedence over products imported from non-EU countries.

The aim of the CAP is to:

- raise productivity in agriculture
- stabilise the market
- secure the supply of food
- give farmers a reasonable standard of living
- stimulate more environmentally friendly production.

CAP is the same policy it was in 1957. It is divided in two. In the EU these are called the two pillars.

The first pillar

A part of the subsidies, determined by all the countries in the EU, is designated for the support of agricultural products of high quality, good husbandry, environmental growing methods that conserve the landscape, and the re-creation of balance between the EU's agricultural markets and those in the Third World.

The second pillar

The second pillar consists of directed reimbursements/replacements and support for the environment and for the countryside. These are formulated in what are called regional development programmes (RDP).

Within given limits each member nation, and in certain cases regions/provinces, makes up its own programme. The differences between the countries is large both as regards what you can receive payment for and how much money is at stake.

The Swedish Rural Development Programme includes economic support to agriculture that contributes to an ecological, economic and socially sustainable development of the Swedish countryside. The Rural Programme covers 2007 to 2013, and is oriented to the following three areas, with continuing focus on the environment:

- increased competitiveness in agriculture and forestry
- environment and the countryside
- improved quality of life and diversification of the economy in rural areas.

Reforms/independent support

CAP has been reformed a number of times over the years, and in June of 2003 it was decided on yet another change to the first pillar, with the aim of creating a long-term sustainable agricultural policy. This policy is to focus on agricultural products of high quality, and on good animal husbandry, environmentally friendly cultivation methods that conserve the landscape, and the re-creation of balance between the EU's agricultural markets and markets in the Third World.

The new expression of CAP means an almost total change, and will adapt agriculture more to the market. The expensive surplus will be limited, and production support will become independent farm support. Instead of letting the subsidy system steer production, production will be directed to what the consumer demands. The subsidy thus no longer steers what the Swedish farmer grows, but the farmer him/herself can decide what he wants to produce, and how much of it. The farmer can also receive support if he doesn't produce anything, as long as the land is held open and properly taken care of.

The member-countries have themselves been able to decide how the national independence process is to work, and the result has been a very technical and difficult-to-interpret reform. Sweden has decided on a mixed model, where the largest part of the support is made independent of production. All EU countries can set aside up to ten per cent of the new subsidy in a national envelope. This envelope can be used to support agriculture that protects and improves the environment, or to improve the quality and marketing of agricultural products.

Sources: <http://www.wwf.se/v/jordbrukslandskap/1122999-kulturlandskapet>
<http://www.wwf.se/v/jordbrukslandskap/jordbrukspolitik/1127774-eus-gemensamma-jordbrukspolitik>

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A more sustainable production on the part of the world's largest companies can make a big difference

WWF's Market Transformation Programme is a large undertaking that works together with truly large companies and their supply chains, in order to support changes in how important global goods are produced, processed and consumed. The intention is to show that goods such as palm oil, soya, cotton, sugar cane, lumber, pulp and paper, fish and shellfish and bio-energy sources can be produced more effectively and responsibly for a small extra cost or none at all. By creating demand for such goods, the market can be tipped, and large-scale, positive environmental profits obtained.

The current estimate is that humankind during the next 50 years will grow to about nine billion, and per capita consumption will double. A huge challenge awaits us. Increased pressure on the earth's natural resources also depends on where and how global industries and their supply chains obtain their resources. The deforestation in the Amazon is closely related to expanding stocks of animals. Borneo's heart is threatened by growing palm-oil, lumber and mineral operations. These and similar markets are most often controlled by a handful of companies. Informed decisions taken by these companies can give enormous environmental profits.

WWF's goal is to ensure that the vital natural resources produced generate profits from ever more sustainable methods, and with measurably less influence on the places and species that are so valuable for the earth's biological diversity. By significantly increasing the demands for more responsibly produced goods,

WWF has shown that markets can change positively – FSC for wood, MSC for fish and shellfish. The key question now is how these changes can occur more quickly and reach more markets.

Sources: 'Market Transformation Fact Sheet', WWF, Jan. 2009.



Solutions. <http://www.wwf.se/v/skog/l/1130662-losningar>

Restoration. <http://www.wwf.se/v/skog/l/restaurering/1130675-restaurering>.

Responsible forestry. <http://www.wwf.se/v/skog/l/skogsbruk/1130668-ansvarsfullt-skogsbruk>

Forest conservation. <http://www.wwf.se/v/skog/l/skogsskydd/1130687-skogsskydd>

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Acting Towards a *One Planet* Future

How can I help develop the necessary competence to deal with sustainable development?

What role can I play in my future work when it comes to sustainable development?

Pedagogic guidance

Education for sustainable development

‘Acting Towards a One Planet Future’ is a concept based on WWF’s goal to diminish the size of our ecological footprint, and at the same time increase biological diversity. This concept focuses on competence. This material is a good tool for Education for Sustainable Development and for Teaching and Learning for a Sustainable Future (ESD and TLSF) at colleges and universities.

During the current Decade for Education for Sustainable Development, the UN and UNESCO have settled on the key role to be played by education for a sustainable future, and have formulated grounds for what must be included in ESD. These grounds have later been built upon and/or are in keeping with international and national policy documents and university statutes and laws in Sweden. Paragraph 5 of the law reads: ‘Universities shall in their activities support sustainable development, which means that current and coming generations are ensured of a healthy and good environment, as well as economic and social welfare and justice.’

According to UNESCO it is essential that ESD develop such competences as:

- The ability to imagine a better future: we must know where we want to go in order to be able to work towards getting there.
- Critical thinking and reflection; the ability to question our present belief system, and to recognise the assumptions and ‘built-in’ valuations that permeate our knowledge, perspectives and opinions.
- Systemic thinking: to understand complexities and seek patterns for how things are connected, to search for synergetic solutions to problems.
- To build partnerships: to learn to work together, to encourage dialogue and negotiation.
- Participation in decision making: ‘empowerment’.

Education and learning of these competences is seen as contextual, i.e. how it happens depends on the context, the people who participate, and so on. For more information see the links below.

DESD documents describe ESD as interdisciplinary and holistic, permeating whole curricula, morally driven, multi-methodological, local *and* globally relevant. This means that many norms and cultural assumptions that one takes for granted are challenged. This is not least so in existing and well-established institutions, such as those of higher education. What knowledge and which attitudes strengthen students’ and pedagogues’ abilities to build a future on one planet?

Action competence

Sustainable development includes changing targets and many uncertainty factors, and thereby makes demands on education to support action that is grounded on dynamic and critical thinking. In other words, education is to be based on relevant and responsible reflection, the pedagogue being aware that while it is impossible to experience the world from one’s own horizon, at the same time it is quite possible to ‘include more perspectives in an effort to distance yourself from the personal’ (Almers, 2009, p. 33).

Critical thinking and emotional engagement

Research shows an increased tendency to action given better knowledge of the strategies for change, as well as a feeling of participating (Kaplan, 2000; Kollmus & Agyeman, 2002 in Almerts, 2009, p. 261). Other research has shown a weak connection between factual knowledge about resource and environmental questions and tendency to act (ibid).

This makes evident the existence of tensions between ‘the demand for a critically distanced attitude on the one hand, and an emotional engagement on the other’ (Almers, P. 35), which makes new demands on education, learning, and pedagogues in higher education.

This tension, dualism even, is an inheritance from Renaissance thinkers and thinking that has grown quickly in our institutions and norms; and when many speak of paradigm shifts, they mean new-thinking that dissolves this kind of tension. Therefore it is important to be careful with the critical questions one uses, and not build on ‘a critically distanced attitude’. You should rather question from the point of view of the students’ ability to see from different perspectives, to systematically try to understand wholes, to be more awake to the problems’ complexity and multiple causes, and to have visions that something else is possible.

In the world in which we live, with economic, social and ecological systems that are not sustainable, the simplest critical questions can have to do with who win(s) and who lose(s) in a given context. Who has the rights of interpretation; who decides the agenda? Whose voices aren’t heard in this situation? Which social, economic, ecological, personal and cultural consequences receive attention (or lack of attention)? What alternatives are there?

Discussion questions and exercises

There are discussion questions and exercises to many of the pages of the multislides presentation. The exercises are also mainly in the form of questions. We have made this division to distinguish discussion and reflection, to give the students space to learn from one another. At a few points at the beginning of the multislides presentation we have questions for discussion, where *opinions* come into focus – this to start a process. But airing opinions has no value in itself, and therefore the larger part of the discussion questions are asked so that they lead to critically grounded discussion.

The questions are suitable for discussion at a plenum, or in small groups or ‘bee hives’ where you discuss two on two, or a combination of these.

The exercises are intended to lead to deeper reflection, to give students the room to understand underlying valuations, causes and less-clear connections, with the help of their own and/or common reflection. Reflection often requires more time, but it can give surprisingly effective results, by the students’ themselves carrying knowledge into the room.

Valuation exercises

The exercise accompanied by picture 7 of ecological footprints and the HDI is an example of a *valuation exercise*. The purpose of valuation exercises is to give the participants the opportunity to take a stand on a particular question, and in the process become clear as to the various ambivalences they may carry with them. By listening to others, one obtains a broader and deeper understanding for different valuations and points of view. Different information/knowledge can show itself to be in conflict, which then becomes a dilemma. Since it’s a question of valuations, there is no right or wrong answer here. On the university level, where the weight of having a critical perspective is maintained, this type of exercise gives excellent opportunities for the pedagogue to investigate underlying valuations in the knowledge that the teaching materials and teaching themselves put across. Finding and creating statements to use in valuation exercises is fun, but it demands some time in the beginning.

During the physical part of a valuation exercise the students should take positions without talking to one another. Afterwards they’re challenged to choose the place that corresponds to their choice. When everybody has found their place, they get the opportunity to motivate their points of view, first in the little group that made the same choice, and then before the whole class. In this process the students can change their standpoints by moving again and speaking from their new position. After that the traditional valuation exercise is finished, but on the university level it is reasonable that such an exercise can be the starting point for a continued discussion and gathering of knowledge.

The most common valuation exercises are:

- The hot chair, where the pedagogue states something that the student agrees with (remains seated) or disagrees with (changes chair). The group usually sits in a circle for this exercise.
- The four-corner exercise, where you begin with four positions that the participants choose between – see picture 7.
- ‘The hot line’, is well suited to a larger group, and consists of an imagined line through the room, symbolising a continuum. The continuum’s extremities represent ‘agree completely with’ and ‘disagree completely with’. The students place themselves along the hot line on the basis of the statement.

Both the line and the corner exercises go through three phases: think and act yourself, discuss with those you seem to agree with, and finally discuss in plenum.

Reflection exercises

The exercise in picture 11 is an example of a more reflective exercise, which is good to use at the end of a specific theme or lecture. The point of this type of reflection is that the whole individual participate.

The process-directed questions can be used at a number of places in teaching and on the multislide presentation:

- What have you learned that you didn’t know before?
- How have you reacted?
- How will you act now – have you ideas about what you’d like to do?

An introduction to sustainability questions

This multislide presentation is a tool for introducing sustainability questions. Apart from suggestions about discussion questions and exercises, we hope that it can inspire you to further study, projects, masters theses, include material as course elements, and so on.

The above research about action competence also raises the question as to how higher education can further develop cooperation with the surrounding community/society, and prepare the way for students to take part in processes that contribute to a more sustainable social development. We believe that concrete cooperative involvement with business, planners and others in sustainability transition work is extremely important for the students’ development of the competence to act.

We believe that the work of changing over to a low-fossil-fuel society, as well as sustainable urban development, is of increasing importance. Here a cooperative effort between the university/college, business, and administration can be an important hub for generating new knowledge and innovations. You can read more about WWF’s work with climate innovations at wwf.se, and contribute with your experiences of how you integrate ESD at www.esdsverige.se.

Interactivity – ‘work in progress’

This multislide presentation is an ongoing project. As you see, texts or questions don’t exist for all of the pictures. Suggestions as to where you can find more information about a particular subject is lacking at many places.

We would like to encourage you and your students to look further and share books, pictures, questions and links that courses and groups at other universities can also benefit from. WWF will upgrade the multislide presentation about once a year (next time: fall 2011). We also hope that together we can create new versions of the presentation in keeping with the goals of TLSF.

Sources: Ellen Almers, *Handlingskompetens för hållbar utveckling*. Dissertation, School of Education and Communication, Jönköping University, 2009.

Characteristics of ESD. <http://www.unescobkk.org/education/esd/about-esd/characteristics-of-esd/>



Characteristics of ESD. '<http://www.unescobkk.org/education/esd/about-esd/characteristics-of-esd/>'<http://www.unescobkk.org/education/esd/about-esd/characteristics-of-esd/>

Common university website on ESD (Swedish: UHU). www.uhusverige.se

Hållbar utveckling och lärande – inspirationsskrift för universitetslärare. <http://www.wwf.se/source.php/1229462/Hållbar%20utveckling%20och%20lärande%20-%20inspirationsskrift%20för%20universitet-slärare.pdf>

On work with climate questions. <http://www.wwf.se/v/klimat/1164070-klimat-startsida>

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