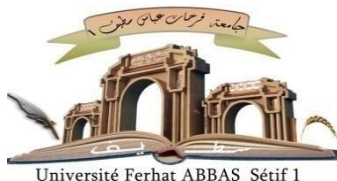


People's Democratic Republic of Algeria
Ministry of Higher Education and Scientific Research



Setif 1 University, Ferhat Abbas
Faculty of Natural and Life Sciences
Department of Basic Studies

Handout for second-year Common Core Ecology

| | | |
|--|--|--|
| | <p>The directed work of Environment and Sustainable Development</p> | |
|--|--|--|

Prepared by Dr. BENIDER CHAFIA

UNIVERSITY YEAR: 2023/2024

Introducing

Environmental protection is both an objective and a strategic direction in order to ensure a good quality of life and sustainable socio-economic development for its population. This reflects the desire to reconcile the obligations of economic growth and the improvement of the social conditions of the population on the one hand, with the requirements of the conservation of natural resources and the protection of the environment on the other. Faced with the seriousness of environmental problems, the environmental sector in Algeria is undergoing changes, notably through the strengthening of the institutional and legal framework, and the establishment of various environmental programs. Environmental policy programs in Algeria were launched in order to achieve objectives and consider solutions, to solve environmental problems, by adopting laws that state and private institutions and associations are called upon to implement.

In this support (08 sessions of Directed Works), we will define sustainable development, we will analyze the indicators of sustainable development, we will show how to manage natural resources with a view to sustainable development and finally we will present the current dimensions of sustainable development, through the Sustainable Development Goals. It is consistent with the new programs established by the Ministry of Higher Education and Research Scientific. The main objective of this documenting is to sensitize the student to assimilate the basic concepts of teaching courses of sustainable development with concrete examples, alongside the economic and social dimensions, and in interrelationships with them. He will thus have acquired knowledge of a basis that it can implement in companies and can become in the future one of the actors own development.

DWN°1: Sustainable development

1. Definition of sustainable development

(in English: sustainable development, sometimes translated as sustainable development) where this expression first appeared in 1987, “sustainable development is a development that meets the needs of the present without compromising the ability of future generations to meet their own needs”.



Figure 1: The three dimensions of sustainable development

2. Agenda 21

Agenda 21 (or Action 21 in French) is an action programme for sustainable development in the 21st century. Adopted by 182 Heads of State at the Rio Earth Summit in 1992. The preamble to the text indicates that Agenda 21 "addresses today's pressing issues and also seeks to prepare the world for the tasks that lie ahead in the next century".

Agenda 21 is composed of 27 principles, including sustainable development, the link between the right to development and environmental protection, the special needs of developing countries, the necessary participation of citizens or the role of women.

Why was Agenda 21 or Agenda 21 created?

UN Agenda 21 was signed by 172 UN member countries. These countries are committed to implementing local environmental, economic and social policies to achieve sustainable development. Each region or locality, for its part, develops its own local Agenda 21, which must involve both citizens, businesses and social organizations, with the aim of developing and approving a sustainable policy agenda.

UN Agenda 21 could be defined as a global strategy implemented locally and involving all sectors of a community: social, cultural, economic and environmental. It is, in short, a commitment to improve the environment and, consequently, the quality of life of the inhabitants of a community, municipality or region. The general and local principles and objectives of Agenda 21 are as follows

2.1. Objective of UN Agenda 21

In principle, Agenda 21 should cover three aspects: environmental sustainability, social justice and economic balance. All depend on the participation of citizens. Agenda 21 is not possible without the participation of citizens, although it is actually encouraged by public authorities and various public or private associations.

It addresses many issues and the objectives of Agenda 21. The themes and objectives of the more strictly environmental UN Agenda 21 include:

- Protection of the atmosphere.
- Planning and management of land resources.
- The fight against deforestation.
- Combating desertification and drought.
- Sustainable development of mountain areas.
- Promotion of agriculture and sustainable rural development.
- Conservation of biological diversity
- Protection of oceans and seas, as well as coastal areas.
- The quality and supply of freshwater resources.
- Rational management of toxic chemicals.
- Management of hazardous waste, radioactive or not.
- Solid waste management.

As we can see, any community can implement its own local Agenda 21 as long as the participation of the social forces that compose it is achieved.

DWN°2: Fundamentals principles of Sustainable Development

The concept of sustainable development is based on a number of principles:

1. Principle of prevention

Action must be taken whenever there is a known and identified risk. These actions should be implemented as a matter of priority by implementing the best available techniques at the minimum acceptable cost.

2. Precautionary Principle

Care must be taken when making decisions to avoid disasters that could harm health and the environment. Provisional and proportionate measures must be taken by the competent authorities to assess the risks incurred and avoid damage. For example, limiting greenhouse gas emissions allows



Figure 2. Example of the precaution principle in the press

3. Principle of Participation and Engagement

Sustainable development requires the participation of all social, political and economic partners in projects. Citizens, as well as project managers and policymakers, must get involved to ensure the success of sustainable projects. Councils must be created to convince and raise awareness among citizens about the importance of such projects for society and the future.

4. Principle of Environmental Protection

Sustainable development is based on the principle of respect and protection of the environment. Without this condition, it would not exist. All sustainable development projects must be environmentally friendly. New technologies developed to reduce pollution must be applied. All

5. Principle of solidarity

Solidarity and sharing of the earth's resources is a fundamental principle of sustainable development. Countries must share raw materials fairly among themselves, leaving them to future generations. Solidarity must exist between States, especially between industrialized and developing countries, as well as between generations. The saving of raw materials is therefore a necessity to respect this principle



Figure 3. Example of the solidarity principle in the press

6. Principle of responsibility

Participants in sustainable development projects must bear the cost of preventive and precautionary measures. Polluters must also cover the costs of the pollution they generate, as well as the costs of reducing and combating pollution. The prices of goods and services are fixed according to the costs they cause both at the level of production and consumption. These prices must be proportional to the rate of pollution generated, that is, those who pollute the most must pay the most. A good example is to make major industrial polluters pay taxes.

7. Ethical principle

Production and consumption methods must minimize negative social and environmental impacts.

We must avoid waste, resource depletion, inequalities between people. The human factor must be taken into account. For example, workers' incomes must be able to provide at least for their needs. Their rights, such as duration and working conditions, must be respected.

8. Polluter pays principle (Ecotaxe)

it means that the polluter should be charged for the expenditure relating to pollution prevention and control measures adopted by the public authorities, so that the environment is in an acceptable state There are taxes for greenhouse gases such as CO₂ and sulphur oxides. Thus, the polluter pays the price for his pollution.

A contemporary example, Swiss, is the heavy-duty royalty linked to services

Determining total weight: 18 t

Emission rate: 2.26 cents per tonne per kilometre

Number of kilometres travelled: 100 km

Calculation: $18 \times 2.26 \times 100 = 4068$ ct, a total payable of 40.70 CHF

The actors of sustainable development

Everyone is dismayed by this transition to a new, more sustainable society. The various actors that are already taking action at their level by carrying out sustainable development actions are:

Algerian and international citizens; young children, parents etc. (changing our habits that affect the environment etc.) - Educational institutions: schools, universities, high schools, campuses etc. (examples...) - Associations and clubs (awareness campaigns etc...) - Companies (improve performance and respect for the environment) - Farmers (less pesticides and chemicals etc...) - Local authorities: cities, regions etc. (green spaces, garbage bins etc.) - The state (through the creation of laws

DW N°3: General Concept of the environment.

1. Definition of the environment

The environment is defined as all the elements (biotic or abiotic) that surround an individual or a species and some of which contribute directly to its needs, or as 'all natural (physical, chemical, biological) and cultural (sociological) conditions likely to affect living organisms and human activities.

2. The components of the environment:

The environment is the world around us. It includes living and non-living.

2.1. Living Beings

- All living things are born, live longer or shorter and die.
- All living beings draw water and nutrients from their living environment to meet their body's needs and ensure their growth. However, it is not always easy to detect that a living being is feeding. Indeed, some living beings stop feeding at certain periods of their life (the marmot that hibernates, the trees that lose their leaves in winter) and the plants feed in a little visible way.
- The ability to move does not distinguish between living and non-living. Air moves under

2.2. The non-living

The nonliving cannot reproduce. It includes mineral components (gaseous atmosphere, water, rocks), elements from life and human production.

- Water can be fresh or salty, frozen, liquid or carbonated. It occupies four-fifths of the Earth's surface. It is a fundamental component of the environment.
- Soil is the thin layer between the atmosphere and the subsoil. It comes from the decomposition of living things after their death and from the degradation of rocks in the subsoil.
- Subsoil contains rocks that differ depending on location and conditions

3.2.1. Mineral components

- The gaseous atmosphere contains various gases: about four-fifths of nitrous oxide (commonly called nitrogen), one-fifth of oxygen, traces of carbon dioxide (formerly called carbon dioxide) and rare gases, water vapour in varying amounts.

2.3. Elements from living and human production

- A bird feather, a piece of wood, a fallen leaf from a tree, etc., and all dead animals are no longer part of life because they are no longer able to reproduce.
- All human productions are part of the non-living: a painting, a computer, a building, a car, etc.

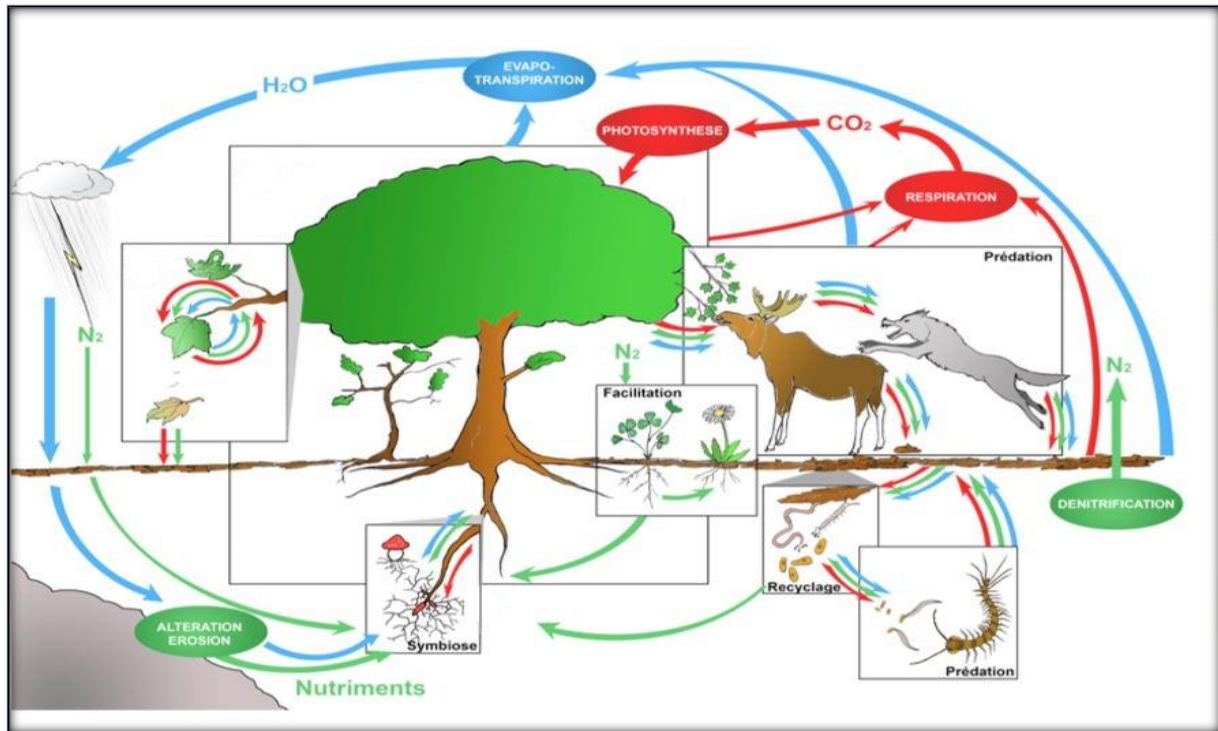


Figure4. The main specific and intra- specific relationships

3. People and the environment

About 100,000 years ago, men began to appear in Africa. The enormous capacity of brain and communication allowed human beings to succeed. Over time, humans multiply and are scattered throughout the earth. Because of humans and their technologies, their impact on the environment increases. These technologies have improved our living conditions in many ways, at least for people living in highly developed countries. At the same time, everything shows that we are headed for an ecological catastrophe. Due to population growth, the development of economic activity, and the sharp increase in consumption and use of resources; man has negatively influenced the environment

3.1. Adverse effects of man on the environment

Among the destructive effects of man on the environment, the increase of the world population leads to the construction of more and more homes and the extension of cities. This extension causes the appearance of construction sites, earthworks and the development of roads and connections between cities, which significantly changes the landscape and transforms nature. The increasing number of means of transport causes air pollution. The enormous amounts of household waste due to the increase of the world population are very difficult or even impossible to manage at present, despite the different techniques that exist to destroy them by minimizing pollution

The industry produces waste of all kinds: solid, liquid or gaseous that are currently a real environmental problem. The chemical industry causes water pollution in rivers and streams, making them unsuitable for fishing and consumption. Water quality is deteriorating and dozens of diseases of humans, aquatic fauna and flora appear.

Black tides due to oil spills in the seas and oceans are real ecological disasters because they cause the loss of hundreds of fish and seabirds. Intensive fishing is responsible for the disappearance of some marine species and the decline of global fish stocks. Finally, the introduction of certain devastating species destroys the natural balance and causes the extinction of species originating in the environment in question.

3. 2. Positive effects of man on the environment

Humans also have a positive impact on the environment. Ecological legislation in almost every country in the world proves this. Current trends around the world to reduce pollution are beginning to be palpable. Some industrial or household waste is recycled. The law increasingly regulates the discharge of harmful waste. The latter are sorted, recovered and treated in suitable places such as incinerators, or transformed into energy. Recycling also makes it possible to recover the raw material and therefore save it, all STEP (Wastewater Treatment Plants) also recover wastewater treatment residues and turn them into biogas used to produce thermal and electrical energy.

The protection of forests against desertification and deforestation is also a positive action of man on the environment. The fauna and flora are protected and the species that live there are thus preserved. The creation of national parks and protected reserves as well as the regulation of hunting and fishing currently significantly reduce the destructive effects of man on nature

DW N° 4. Natural resources

1. Definition

A natural resource is a good or service provided by nature without alteration by human beings. Natural resources are valuable to human societies because they contribute directly to their well-being and development (raw materials, minerals, food) or indirectly (services and more).

2. Non-renewable and renewable resources

Depending on availability over time, rate of production (or regeneration) and rate of use or consumption, natural resources are classified as renewable and non-renewable. Renewable natural resources refer to biotic resources, resources whose regeneration cycles are greater than their level of extraction. Excessive use of them can turn them into extinct resources (forests, fisheries, etc.) although many of them are unlimited (sunlight, tides, winds, among others...). In contrast, non-renewable natural resources are generally limited deposits or regeneration cycles that are much lower than extraction or exploitation rates (mining, oil, etc.). Sometimes it is the abusive and uncontrolled use that makes them exhausted, for example, in the case of species extinction. Another phenomenon may be that the resource exists, but cannot be used, as is the case with contaminated water, etc. The consumption of resources is associated with the production of waste: the more resources we consume, the more waste we generate.

2.1. Non-Renewable Resources:

Non-renewable resources are natural resources that cannot be produced, cultivated, regenerated or reused at a scale that can sustain their rate of consumption. These resources often exist in fixed quantities because nature cannot recreate them over short geological periods. Reserves are called resources that can be extracted profitably. The economic (monetary) depends on its scarcity, demand and use, and that is the question that concerns the economy. Its usefulness as a resource depends on its applicability, but also on the economic and energy cost of its location and operation.

Some of the non-renewable resources are: deposits of coal, oil, minerals, metals, natural gas, and groundwater, in the case of confined aquifers without recharge. Reserve accounting is the subject of many disputes, with the most optimistic estimates from companies and the most pessimistic from groups and academic scientists. Where the confrontation is most visible is in the area of hydrocarbon reserves. Here, the former tend to present as reserves all known deposits plus those they expect to find. The latter point to the increasing monetary cost of exploration and extraction, with only one new barrel found for every four consumed, and the increasing thermodynamic (energy) cost, which decreases the average use value of the new results.

3. The different types of natural resources

There are different types of natural resources:

- a renewable raw material, such as fresh water, potting soil, etc.
- a non-renewable raw material, such as oil and gas....
- a fossil material, such as rocks, ores, oil, etc.
- an organic, wild, cultivated or livestock product, such as animals, tree wood, peat, cereals, etc.
- a renewable energy source, such as the sun (solar energy), wind (wind energy)...
- a non-renewable source of energy, such as conventional energy sources (oil, etc.)

2.2.The different types of renewable energy

a- Solar energy

Converting solar energy into electricity or heat from panels or Solar. The sun, the main source of different forms of energy renewable energy available on earth.

There are two types

b- Photovoltaic solar energy

Photovoltaic solar energy directly converts light radiation (solar or otherwise) into electricity. To do this, it uses photovoltaic modules made up of solar cells or solar cells that carry out this energy transformation.

c-Solar thermal energy

It is radically different from photovoltaic solar energy, which produces heat from infrared solar radiation in order to heat water or air. In this case, thermal sensors are used, which are based on a completely different technology.

In common parlance, these are "solar water heaters" or "hot air collectors".

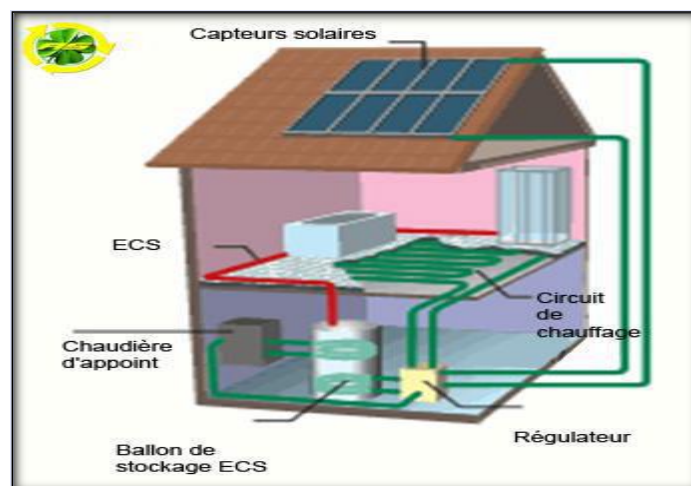


Figure 5. Thermodynamic solar energy

There's also what's called thermodynamic solar energy, which works on the principle of concentration of the sun's rays by means of curved mirrors, a fireplace placed on a tower that stores calories and then releases them in mechanical form, e.g. with the help of a steam turbine.

e- Wind energy: It is energy produced by the wind by means of a wind turbine or a windmill.

f- Hydropower : Using waterways to generate electricity

g- Geothermal energy : The principle is to extract the geothermal energy contained in the ground. Most of the earth's heat is produced by the natural radioactivity of the rocks that make up the earth's crust.

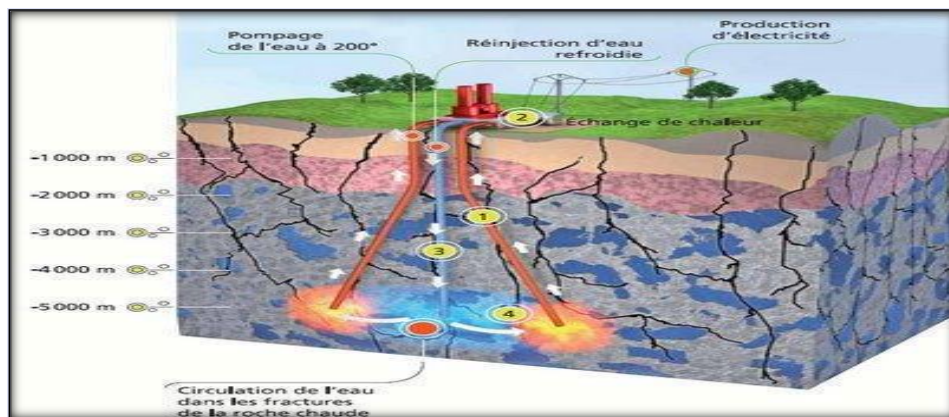


Figure6. Geothermal energy

h-biogas energy :

Use of energy generated by the combustion of methane gas collected and produced by organic waste from agriculture and industrial landfills.

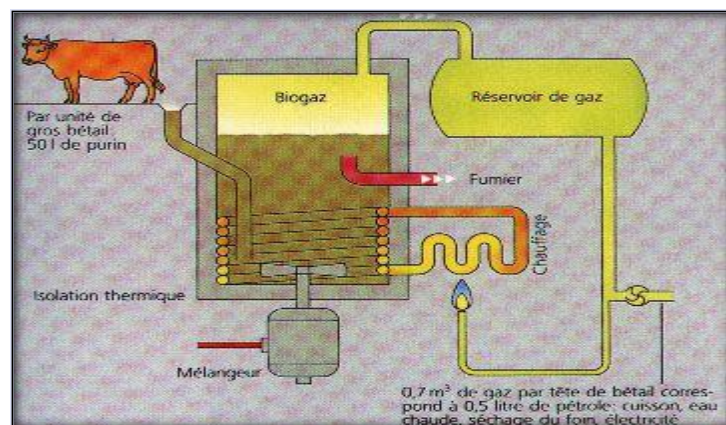


Figure7. biogas energy

i-Biomass energy :

It is energy stored in organic form through photosynthesis, and exploited by combustion (wood and other biofuels). It is considered renewable if it is assumed that the quantities burned do not exceed the quantities produced.

DW N°5: comparison between biodegradable and non-biodegradable products (Environmental Labelling)

At all stages of its life cycle, a product generates negative impacts on the environment: depletion of natural resources (mineral, plant or animal), energy consumption, pollution due to discharges into water, air or soil... Indeed, every product needs materials and energy to be manufactured, to be packaged and transported, knowing that it will one day become a waste.

While there are no products that do not have an impact on the environment, some stand out by having less significant impacts at different stages of their life cycle.

1. Defining the life cycle of a product :

The Life Cycle Analysis (LCA) of a product aims to systematically assess the effects from the life of the product from its cradle to its grave, that is evaluate the flows (of materials or energy) in and out at each stage of life from the extraction of raw materials to the final waste. LCAs have been standardized by ISO standards (14040 to 14043) since 1994

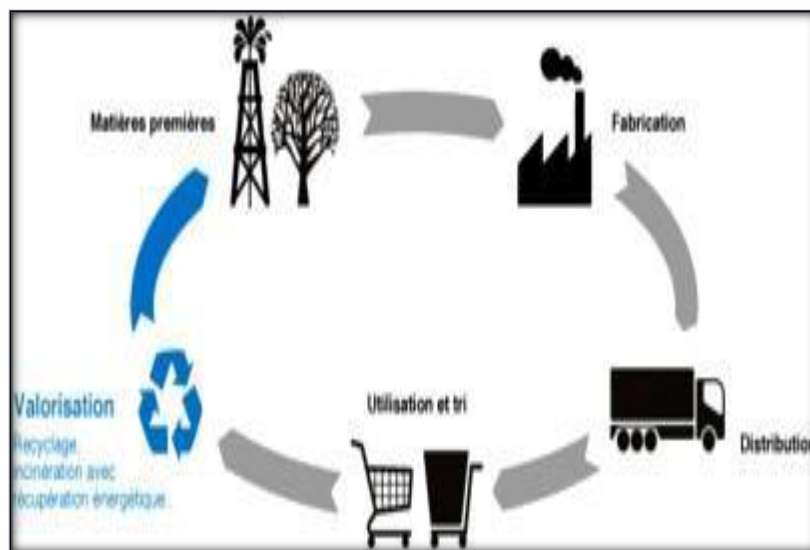


Figure 8. The life cycle of a product

2. Comparison between biodegradable and non-biodegradable products :

Biodegradable product can be naturally broken down into environmentally friendly components through biological processes. In contrast, non-biodegradable product do not decompose easily and can persist in the environment for long periods, potentially causing pollution and damage.

2.1. Non-biodegradable product :

Materials or substances on which biological processes cannot act are called non-biodegradable substances. These products are inactive and may continue to exist in the environment for thousands of years. Some of them can even harm a risk of its other elements and components. Examples are plastics, metals and synthetic chemicals. Most non-biodegradable substances tend to be generated by humans in some laboratories through experimentation. Therefore, efforts to make these materials resistant to physical and biological processes are considerable. The aim is to create sustainable substances so that products made from these substances remain safe long after use.

Unlike biodegradable substances, non-biodegradable substances do not decompose under the action of microorganisms. Heat and pressure can melt them in the long run. However, the time taken by such physical processes is too long for the health of the planet.

One such intervention is the application of the waste management hierarchy. The 3R concept of Reduce, Reuse and Recycle is an essential tool in the waste management hierarchy.

Reducing means selecting and using resources carefully to generate minimal waste.

Reuse refers to the repeated use of goods or their components that are still usable.

Recycling consists of transforming waste into useful resources.

2.2. biodegradable product

A product is called biodegradable when it reintegrates without nuisance a cycle of regeneration of natural substances. After use, it must therefore be able to be absorbed or decomposed by living beings (usually microorganisms present in the soil such as fungi, bacteria, etc.) and/or spread naturally, without non-assignable residues or toxic to the ecosystem of the place under consideration. The whole process must also take place over a short period compared to the temporality of human activities. Paradoxically, some petroleum-derived plastics are biodegradable.

Industrial products and wastes that a bacterial action, natural or induced, decomposes quite quickly and makes them disappear from the environment by converting them into simple molecules usable not plants

It is said that a product is biodegradable when it is made of organic matter and that it is likely to decompose in a favorable environment and under the action of microorganisms. Thus, depending on the conditions of temperature, humidity, light or oxygen or thanks to bacteria, fungi or algae for example, it will tend to decompose more or less quickly.

COMPOSTING: NATURAL PROCESS a compostable product is also biodegradable. In large quantities, it is a product whose decomposition is helped by forcing a favorable environment. So we will play with the different variables. Generally, we situate them this way:

- Temperatures between 70 and 80°C
- 70% moisture content
- Oxygen levels approaching 20%

Simmer for a few weeks to give birth to compost

RECYCLING: A SECOND LIFE a product is qualified as recyclable when it can, at the end of its life, be reintroduced into the production cycle of a new product. It is useful for making it.

For example, glass or paper are considered recyclable. Newspapers, magazines or magazines can easily be recycled. This is how we can find packaging created from these materials such as molded cellulose for example.

Recycling has been introduced in cities and businesses to facilitate these steps and save money. The products and materials are then put back on the market as a consumer good and the cycle starts again. Today in France, 67% of waste is sorted and recycled.

Materials that have not been disposed of in the correct recycling bin. Releases are sent to landfill or waste incineration sites

Table 1. of comparison between biodegradable and non-biodegradable products:

| Functionality | biodegradable product | non-biodegradable product |
|----------------------------------|--|---|
| Definition | Substances that can be broken down by natural organisms such as bacteria, fungi and worms | Substances that cannot be broken down by natural organisms |
| Decomposition Time | Relatively short, ranging from a few days to several months | Very long, ranging from several years to several thousand years |
| impact on the environment | Have minimal impact on the environment as they are broken down and recycled in the ecosystem | Can have a significant negative impact on the environment as they accumulate and pollute the land, water and air. |
| Examples | food scraps, paper, wood, leaves, human waste | Plastic, glass, metal, rubber, chemicals |
| Advantages | Reduce waste by breaking down and returning nutrients to the soil | Strong and durable, has longer service life |
| Disadvantages | Attract parasites and animals | May harm wildlife if swallowed |
| disposal methods | Composting, recycling, landfill | Recycling, landfill (with special precautions) |

3. Environmental labelling of products:

Organic farming and its products guarantee more environmentally friendly production methods. For example, the non-use of pesticides and chemical fertilizers in organic farming prevents the deterioration of arable (fertile) soils and pollution of groundwater and rivers.

The loop of Moebius

A triangle of three thick twisted arrows, the Moebius loop is the international symbol of recycling. Accompanied by a percentage, it indicates that the product is made from recycled materials. Without a percentage, it simply means that the product is recyclable.

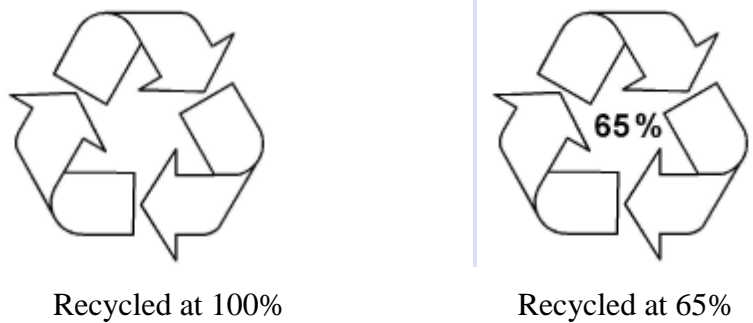


Figure 9. simple of recycled dechet

Green Dot:

You see it blooming on almost - all packaging, since January 1, 1993. This logo is now present on 95% of the packaging we buy (source Eco-Emballages). In Europe, 9 other countries use this logo: Germany, Austria, Belgium, Spain, Ireland, Luxembourg, Portugal, Norway and Latvia.

Every year, the "Green Dot" appears on more than 400 billion products sold in Europe and it is seen by more than 220 million inhabitants.

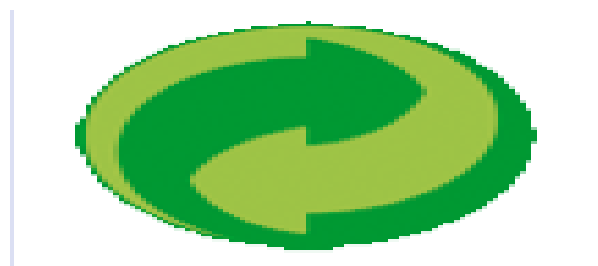


Figure 10. Green Dot

Recycled paper: A paper or cardboard is not necessarily made of 100% recycled cellulose fibres. To put an end to the vagueness that prevailed in the name "recycled paper", the APUR (Association of producers and users of recycled paper) decided to create a brand guaranteeing the name "recycled paper".

The WEEE logo (Waste electrical and electronic equipment):

The decree on the composition of electrical and electronic equipment and the disposal of waste from this equipment was published in the Official Journal on 22 July 2005. It lays the foundations for better management of this waste.

It is estimated that each citizen produces 14 kg of such waste per year (refrigerator, washing machine, televisions, computers, toaster, drill...) and the total amount produced increases by 4% each year(1). Products placed on the market must bear the logo (a crossed-out trash can) indicating that they should not be thrown in the trash.

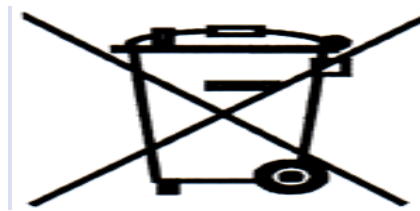


Figure 11. On the packaging of cosmetic and pharmaceutical products.



Figure 12. hazardous dechets

DW N°6. The Polluter-Pays/User-Pays Principle

The Rio Declaration states that “National authorities should strive to promote the internalization of environmental protection costs and the use of economic instruments, under the principle that the polluter should in principle, bear the cost of pollution in the public interest and without distorting international trade and investment” (Rio Principle 16).

The notion of polluter pays has become more nuanced. We are now talking about “user-pay”, when a public authority imposes a fee for the use of a resource in order to reduce its use.

1. What does polluter pay mean?

The principle of the polluter who has to pay is based more on economic than legal considerations, since it is the work of a British economist, and aims to allocate the costs of the fight against environmental pollution to the person who caused it. The polluter pays principle presupposes that the costs related to the prevention and reduction of pollution, the decontamination and the restoration of a damaged environment must be borne by the polluter at the origin of the damage.

The ultimate goal is that the natural or legal person, public or private whose activities are likely to cause damage to the environment becomes more inclined to make the right decisions to reduce this cost. It will make the habit of making the best choices about its impact on the environment because it knows it will have to pay.

2. The polluter pays according to Algerian legislation

In Algeria, The polluter pays principle was adopted by an OECD recommendation on 26 December 1972, environmental taxes are set by Executive Decree No. 09-336 of 20 October 2009, which contains the list of polluting and hazardous products and the corresponding taxes.

The Ministries of Environment, Trade, Industry and the Interior and Local Authorities are the main authors of these texts, specifies the same person who is responsible for the economic operators being also involved because they are the first concerned.

The polluter pays principle, applied by a large number of countries, aims to ensure that economic operators, particularly industrialists, take into account the negative environmental effects of their activities and, therefore, to bear the costs of pollution prevention and control measures.

3. What is ecological taxation

Ecotaxes, eco-taxation, ecological taxes, ecological taxation, green taxes, environmental taxes, environmental taxation or green tax, all these appointments designate one and the same instrument. It is an emerging form of taxation that clearly aims to protect the environment and natural resources by limiting their degradation and overexploitation. Several taxes on polluting products imported or produced locally are means of environmental protection. In addition to their

deterrent aspects, they are a source of public funding to preserve nature and therefore the health of people. Environmental taxation is part of the instruments of the public authorities, and especially of the State to conduct an action, even an environmental policy

3.1. Tax on polluting or environmentally hazardous activities

Instituted by Article 117 of the Finance Law for 1992, this tax applies to activities in Executive Decree No. 09-336 of 20 October 2009 which defined the activities subject to the tax on polluting or environmentally hazardous activities

3.2. Example of successful application of the polluter pays principle

In Algeria : the producer of the waste in the 1980, a company specializing in collection, recovery and recycling ICPE has started to operate. Subsequently, 3,500 m³ of hazardous waste was stored on this ICPE site, on the ground and out of the weather. This can cause soil pollution to heavy metals and rare earths. Note that the ICPE site was not authorized to operate a hazardous waste storage facility. In 2014 and 2018, the prefect asked the ICPE operator to dispose of hazardous waste in appropriate treatment lines. In July 2020, a letter is sent to the Regional Directorate of Environment, Development and Housing (DREAL). The ICPE operator then asks DREAL to give notice to the company to dispose of the waste, in its capacity as producer of the waste. At the beginning of December 2020, DREAL gave notice to the company to produce a waste disposal plan. At the beginning of December 2020, DREAL gave notice to the company to produce a waste disposal plan.

Then at the end of December 2020, the company contacted the ICPE operator to announce that it will proceed with the waste disposal. Finally, in September 2021, the company disposed of waste for an estimated 1.5 million euros.

□ **In Denmark:** an energy tax was introduced after the oil shocks and now applies to all forms of energy. In 1991, to help combat the greenhouse effect, a carbon dioxide emissions tax was introduced, initially set at EUR 13 per tonne of CO₂, but with partial exemptions for energy intensive companies. In 1995, the CO₂ tax rose to 80 euros per tonne, but companies benefited in exchange for a reduction in social security contributions. Environmental taxes brought in 320 million euros to the State in 2000, and these revenues were allocated for 233 million euros to reductions in expenses.

In Ireland: the Irish tax on plastic case bags. In 2002, a tax of 15 euro cents was introduced on each bag distributed. In one year, the consumption of bags was reduced by 90%.

En Irlande : la taxe irlandaise sur les sacs en plastique. En 2002, une taxe de 15 centimes d'euro a été introduite sur chaque sac distribué. En un an, la consommation de sacs a été réduite de 90%.

DW N°7: sustainable development indicators

1. Sustainable development indicators:

It is a quantitative data that allows to characterize an evolutionary situation, so as to evaluate it and compare its state at different dates. The indicator can be a form of perception, that is, a qualitative element.

There are three main types of indicators.

1. Indicators of the economic pillar,
2. Environmental pillar indicators,
3. Indicators of the Health and Social Pillar.

1.1. Indicators of the economic pillar :

Per capita GDP growth rate :

Economic prosperity is an important pillar of sustainable development. A dynamic economy is an engine of development and growth. Gross domestic product (GDP) per capita remains the most commonly accepted synthetic aggregate, although its limits are well known. The level of GDP shows the ability of an economy to meet present and future social and environmental needs.

1. 2 . Environmental pillar indicators

The ecological footprint, also called the environmental footprint, is a measure of the pressure that man exerts on the planet. Measured in global hectares (hag) or in the number of planets, it makes it possible to estimate the Earth surface needed by each individual to meet his needs.

1.2.1. Calculation of the ecological footprint

The calculation of the ecological footprint takes into account the following two factors:

The bio-capacity of the Earth, the capacity of the planet to generate resources. Human activity and its ecological impact: the resources consumed by humans and their waste.

Ecological footprint = Population Consumption per person Resource and waste intensity

On average, a European would need 4.5 hectares, while a North American would need 6.6 hectares and an African 2.7. The results of this calculation on a global scale show that the capacity of the planet to meet the needs of its inhabitants is insufficient.

Ex 1: Transport

The annual ecological footprint of a person who goes to work every day, with a 10km journey, is:

120 m² by bike

420 m² by bus

2.000 m² by car

Indeed, one hectare of healthy forest has the capacity to absorb in one year the CO₂ from the combustion of 2500 liters of oil or gasoline... If you fill up once a week on average, this is what you need! With regard to air transport, it should be noted that every 10 hours spent by plane, it takes 0.5 hectares of forests and a year to “digest” pollution...

Ex 2: Considering the energy, transportation, fertilizer and other inputs that are required for greenhouse cultivation, a greenhouse tomato has an ecological footprint 10 to 20 times greater than a field tomato.

Ex3: A hectare of land cultivated for a year can give on average 7 times more calories in the form of vegetable food than in the form of meat (animal). It takes seven times less surface for a vegetarian than for a meat lover. Other animal products such as milk, eggs, etc. have a slightly lower ecological footprint than meat, especially organic.

1.2.2. Environmental Performance Indicator (EPR)

This indicator measures a country’s performance from an ecological point of view. Like economic GDP, the IPE gives a general idea of a country’s environmental actions.

This index was created in 2006 by the major American universities of Yale and Columbia. Each country receives a score between 0 and 100, 100 being the best score, according to different criteria and statistics.

1.3. Socio-Health Pillar Indicators

Human Development Indicator (HDI)

Created by the United Nations Development Programme (UNDP), the HDI is a composite indicator that measures the evolution of a country according to three basic criteria of human development

Happy Planet Index (IPH)

The Happy Planet Index, or the Happy Planet Index (IPH), is one of the most recent international aggregate indicators to have appeared in the field of social progress calculation.

According to the authors, the goal of society must be to enable its citizens to achieve happiness, but the most widespread existing indicators do not measure this happiness. They criticize gross domestic product (GDP) and the Human Development Index because they do not measure the goal of happiness.

This indicator has an important logic:

This happiness must be made with the smallest environmental impact possible, so that future generations can also achieve their happiness.

Index of Well-being (IB)

According to Prescott-Allen, sustainable development is a combination of human and ecosystem well-being. It defines human well-being as follows:

A society is in a state of well-being when all its members are able to identify and meet their needs and have at their disposal a wide range of choices to realize their full potential, He also says that an ecosystem is in a “state of well-being when it is able to maintain its diversity and quality and therefore its ability to meet the needs of the population and all that lives, to adapt to change and to offer a wide range of choices and opportunities for the future. This indicator demands well-being of the ecosystem, because the latter: "is the pillar of life and makes possible any standard of living For the calculation of the well-being index (IB), a human well-being index (HBI) and an ecological well-being index (EB) are calculated separately.

Examples:

Healthy life expectancy

Sustainable development is also about better health. Living better means living. Life expectancy therefore becomes a central indicator. More and more people are talking about “healthy” life expectancy, which reflects the lengthening of life without major disability. According to the IPH, the ideal score for life expectancy is 85 years

Healthy life expectancy in some countries:

Ivory Coast: 46 years (H=46/ F=47.5),

Zambia: 38 years,

France: 64.3 years F and 62 years H,

Northern Europe 80 years.

In rich countries, aging requires a specific health framework

The poverty rate :GDP does not tell us how revenues are distributed. To better understand the links between GDP and well-being, income inequality must be taken into account.Upstream, inequalities in access to employment and education.

Poverty (less than 2 dollars/day) affects more than 50% of the poor countries (46.3% in Côte d'Ivoire in 2015 against 48.9% in 2008) while in European countries, it concerns 12% (Sweden and Denmark).

DW N°8: Sustainable Cities and Eco Neighbourhoods

1. The Sustainable City:

The sustainable city according to Richard Rogers as an ecological city that minimizes its impact on the environment, or landscape and built form are balanced and where buildings and infrastructure are safe and efficient in their use of resources

A sustainable city is an urban centre designed to improve its environmental impact through urban planning and management. To define a green city, imagine cities with parks and green spaces, solar-powered buildings, rooftop gardens and more pedestrians and cyclists than cars. This is not a futuristic dream. Smart cities are actively moving towards greener urban ecosystems and better environmental management

The goal of a sustainable city:

- 1- No waste
- 2- No carbon emissions
- 3- Quality of life development
- 4- Use of sustainable transport
- 5- Protection of fauna and flora
- 6- Control of water consumption
- 7- Food based on environmentally friendly local products
- 8- Use of certified materials and recycling

1.1. The eco-districts

The term eco-district has gradually emerged as part of the reflections on «sustainable urbanization», a movement that started from the ecological emergency and which carries a desire to transform the ways of manufacturing and inhabiting cities but, if the word is now very popular with the media and professionals of urbanization

Definition of an eco-district

An eco-district is an urban area designed, organized and managed in a sustainable development approach. These neighborhoods must thus have a potential for development economic, meet rigorous environmental performance criteria (public transit, waste recycling, eco-construction, etc.) and ensure social and functional diversity (housing, shops, public facilities, etc.).

Cities can do a number of things to support sustainable practices:

- Facilitate travel without a car;

- Add electric vehicle charging stations;
- Provide access to public resources and green spaces;
- Improve water conservation and wastewater management;
- Support urban agriculture;
- Implement green architecture

The five pillars of an eco-neighbourhood:

The five pillars of an eco-district

Housing: building energy-efficient housing

Travel: prefer walking, cycling and public transport

Waste: reducing waste through reuse, recycling and recovery

Plants: improving spaces that consume CO₂

Cleanliness and water: improve cleanliness and recover rainwater



Figure 13. The fundamental factors in neighbourhood life

The ten (10) sustainable cities in the world:

- | | |
|--------------|--------------|
| 1. Zurich | 6. Frankfurt |
| 1. Singapore | 7. Seoul |
| 2. Stockholm | 8. Hamburg |
| 4. Vienna | 9. Prague |
| 5. London | 10. Munich |

2. Restoration and conservation ecosystem:

Ecosystem restoration, is defined as the “process of assisting in the restoration of a damaged, degraded or destroyed ecosystem”. It is the intentional transformation of an environment to restore the ecosystem considered to be indigenous and historical in relation to its specific composition, community structure and its ecological functioning

Ecological disturbance:

One or more natural or anthropogenic events altering, in time and space, the relationship between living organisms and their habitats. Ecological disturbance

Generate impacts on ecosystems:

=> Destruction and disturbance of plant and animal species

=> Soil degradation (dewatering, acidification, etc.)

=> Alteration of food chains

=> Light pollution...

For example **The restoration of a soil** therefore consists, among other things, of restoring the associated ecological structures and processes. Hydrological balance, nutrient cycling, biodiversity, water and nutrient storage, C sequestration and ecosystem resilience are restored. The application of fertilizing residual materials in agricultural or forestry environments is a means of diverting a significant amount of material from landfill and incineration. In addition, restoration measures involving the use of these sludge could restore the structure, functions and ecological processes of degraded borer soils.

Soil Restoration Practice :Restoration aims to restore ecological processes (e.g. bedding inputs, decomposition, C immobilization and nutrient cycle processes, surface water retention and circulation) The addition of amendments rich in organic matter is also commonly used for the restoration of degraded forest soils. The spreading of municipal septic tank sludge rich in organic matter is therefore an interesting alternative to restore the ecological services of the system

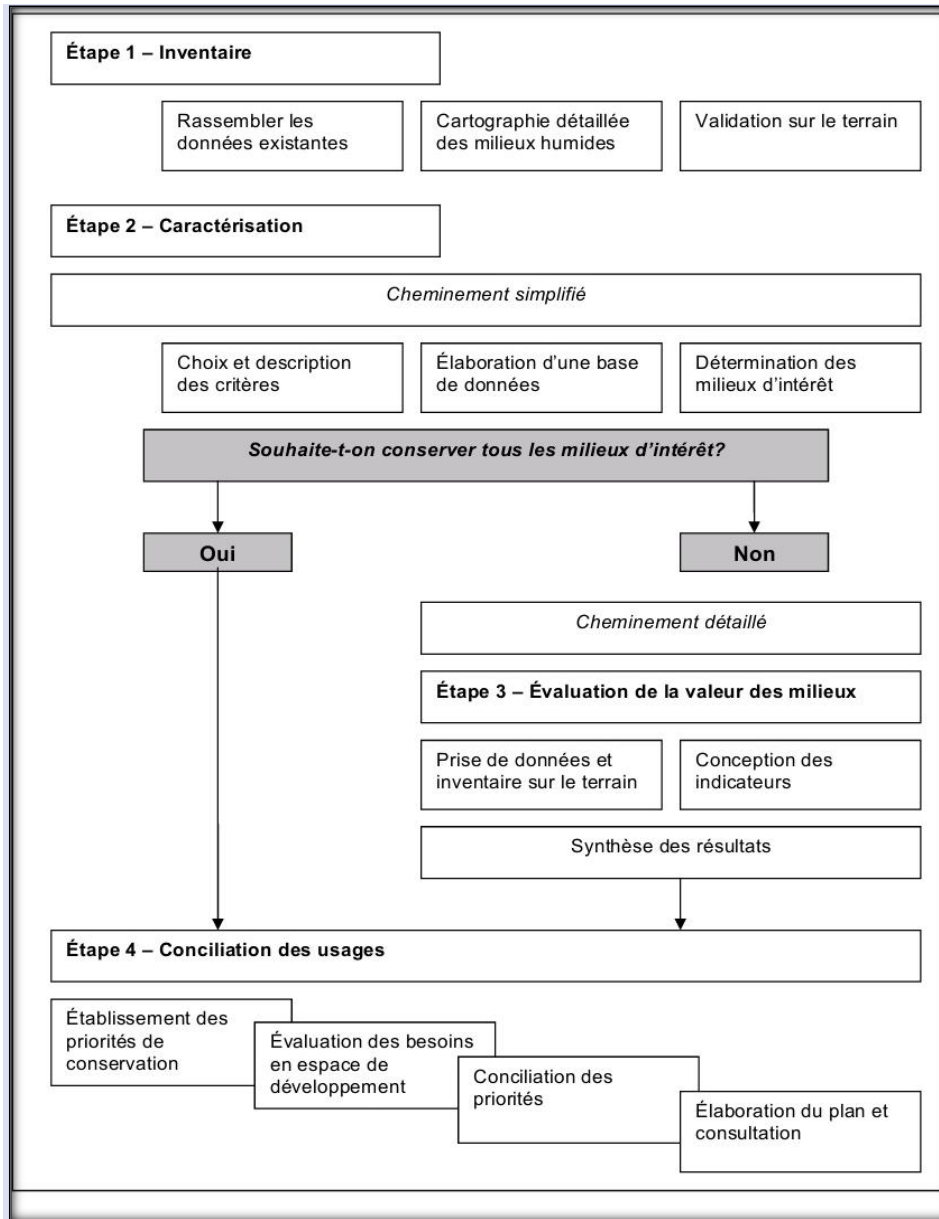


Figure 14. wetland conservation action plan

References

1. Allah-Kouadio, R., Cisse, B and Gregoire, L-J.2015. Sustainable Development and the Emergence of Africa,Mayenne, France, EEC,782p
2. Anonymous, 1999.Ecological indicators and environmental reporting, Seminar organized by SANU, Nestlé Switzerland SA, Vevey, Switzerland.
3. Baddache, F.2010. Sustainable development. Éditions Eyrolles 61, Bd Saint-GermainParis,207p
4. Boutaud, A and Gondran, N., 2008. The ecological footprint. La Découverte, Paris, 122 p.
5. Chauveau, L. 2006. Sustainable development producing for all, protecting the planet, 3^e Ed LAROUSSE , 127p
6. Christophe, B. 1992. Environmental accounting and its issues, *Revue Française de Gestion*, juinjuillet- août, p. 96-104.
7. Djamane, M. F. 2009. environmental communication a powerful tool against pollution. Marine pollution in Algeria, *Memoire magistere Univ D'oran* ,284p
8. Euzen, A., Eymarrd, L and Gaill, F. 2013.Sustainable development has discovered, CNRS Éditions, Paris, 116p
9. Kettab, A., Mitiche, R and Bennaçar N.2008. Water for Sustainable Development: Issues and Strategies *Water Science Review*, 21(2), 247-256
10. Lévêque. Ch and Sciama. Y. 2005. "Sustainable development". DUNOD. 226p.
11. Nadin, P.2008.The Mediterranean Region as a Biodiversity Hotspot.
12. Person, M., Brodhag C. 1999.Environmental performance assessment of SMEs, *Industrial Engineering, Engineering Techniques*, vol A 8, G 5 100p.
13. Sandron, F. 2002. Economic growth and population growth: theories, situations, policies In: Charbit Y. (dir.) *The developing world: demography and socio-economic issues* Paris: La Documentation Française, 15-41. (Les Etudes de la Documentation Française). ISBN 1152-4677
- 14.Tyteca, D.2002. Problematic of indicators in environmental and sustainable development, *Congress of the Mineral Industry Society* ,15p.