THE NATURE OF FOOD.

JUST ONE EARTH
TO FEED THE ENTIRE PLANET

EDUCATIONAL BOOKLET
THE PROJECT
“The Nature of Food. Just one Earth to feed the entire Planet”

This educational booklet is produced by a project that includes a whole series of different initiatives that together make up the themes of Expo 2015 in the regions, directly involving:

• individuals and families that will visit the Oases and the WWF Environmental Education Centres in 2015, along with the WWF Milan office
• school pupils of different levels and grades, and teachers through the Environmental Education Centres with materials and educational courses and training seminars recognised by the Ministry of Education (MIUR)
• the general public that will be informed about them through the usual communication media and social networks

By directing general attention of the 2015 Universal Exposition to the theme “Feeding the Planet, Energy for Life”, the WWF wishes to stimulate reflection on the current relationship between the quality of individual diets and the preservation of the structures and functions of ecosystems that all contribute to supplying our food (as a fundamental service of the ecosystem) both globally and locally. It also wishes to stimulate consideration about the sustainability of agricultural practices and of food chains for the preservation of water resources, the fight against climate change, and the protection of biodiversity.

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Our societies are going through a moment of transition from an era of abundance in food availability to a situation of scarcity. It has become increasingly clear that, in the words of Lester Brown, food is as important as oil and agricultural land is as precious as gold in this new historical period.

With the destruction of the tropical forests, the exploitation of marginal lands and the exploitation of environmentally sensitive areas, agriculture and animal husbandry have become the main environmental threats to the biosphere. Agriculture already occupies a large percentage of the earth’s surface, destroying habitats and biodiversity, consuming water, polluting rivers and oceans, and, with animal husbandry, emitting a quantity of greenhouse gases much higher than is the case with any other human activity.

It is now clear that in order to guarantee the long-term health of the Planet, we must drastically reduce the negative impact of intensive agriculture. We must reduce the consumption of natural resources, transform markets and change our lifestyles. The global food system must ensure adequate food for more than seven billion people currently living on the Planet (over a billion still suffer from chronic hunger!) and guarantee adequate food for over two billion people who will be added in the next thirty years, and this will have to be done in a way that is environmentally sustainable and equitable from the social and human rights points of view.

These are the themes of EXPO 2015, “Feeding the Planet, Energy for Life”, the universal exhibition in Milan which for the first time includes the participation of the civil society: like other NGO’s, the WWF is a “civil society participant” and offers a rich programme of events and contents providing its contribution in terms of ideas, critical reflections and concrete proposals.

Such an important challenge as the one we are facing now has two vital allies in the world of official education and non-formal learning. If we don’t spread information, knowledge, enthusiasm, beginning from the younger and doing it all life long, if we don’t spread the competences and skills needed to understand the environment, its hardships and the related dynamics, we can’t drive society towards the choice of sustainability nor make these changes long-lasting.

Donatella Bianchi
(WWF Italia President)

1 L.R. Brown, Full Planet, Empty Plates: The New Geopolitics of Food Scarcity, Earth Policy Institute, 2012
WWF’s educational materials are designed to support teachers in promoting students’ proactiveness, vision, critical sense, design ability and communication and relational skills.

The Nature of Food, one Earth to feed the entire Planet is the educational booklet that presents educators and teachers at schools of different types and levels and their students, with the theme of Expo 2015, ‘Feeding the planet, energy for life’ and the in-depth study that the WWF considers to be most relevant on an environmental, educational, and cultural level:

1. The relationship between the quality of the diet of individuals and the conservation of the structure and functions of ecosystems.
2. La sostenibilità delle pratiche agricole e delle filiere agroalimentari per la conservazione delle risorse idriche, la lotta ai cambiamenti climatici e la tutela della biodiversità.

In the educational booklet, a short informative introduction is followed by several practice worksheets: a food sample gets deeper into the theme related to it moving on to practical activities to complete with the class.

The strength of these materials is in the methodological approach that consists of:
• an effort to communicate the complexity of the problem to be dealt with;
• the educational and training framework (proposal of approaches and of activities, games, labs) is thought to motivate students to explore and deepen their understanding of the subject, to understand by doing and to motivate action;
• a multidisciplinary and interdisciplinary approach;
• being a complete approach rich in additional stimuli and possible knowledge enrichment.

The teacher will be able to choose among the proposed topics and activities to build, depending on the discipline area and the yearly program, those which are most useful.

Further study material are available on http://www.oneplanetfood.info, which contains valuable teaching tools such as the expense virtual shopping cart, which allows you to discover the environmental cost of our grocery shopping http://www.improntawwf.it/carrello
If we think about a dish of spaghetti or a roast beef with potatoes or a hot minestrone, do we know the route the food took that ends up on our plate?

The vegetables, pasta, tomato sauce, meat, grated parmesan over the spaghetti, how were they produced? What part of the world did they come from? And who packaged, distributed, and transported them to the place where we bought them?

The answers to these questions help us to understand how each food item is a combination of matter and energy and how the path ‘from the cradle to the grave’ has effects on the natural environment, on human health and on the economy of our society.

For example, to fish the cod in our fish burgers we needed: fuel for the boat engine, nylon nets for a catch, refrigerating for preservation, plastic for the packaging, the trucks for wholesale markets distribution for fast-food, fishmongers and supermarkets. Each of these steps have an effect on the environment such as, for example, emission of carbon dioxide into the atmosphere (which contributes to global warming).

Global warming, desertification and biodiversity loss are just some of the changes that the Planet is currently undergoing, in part because of how we produce and consume food.
A food system that is today based on fossil fuels, on wasteful food habits, on pollution and on the overexploitation of resources that has evolved and become deeply rooted in western industrialised societies is no longer a feasible model, neither for the countries that created it, nor for those that have sought to imitate it.

However, we are continuing to apply a system based on the pursuit of continuous material and quantitative growth, and on the models of resource usage that are based on over-consumption, which is resulting in seriously debilitating economic, social and environmental effects.

Today we have a real opportunity to forge a new sustainable food model that finally puts nature and the human being at the forefront, and that properly acknowledges an irreplaceable capital resource that is the fundamental basis of our well-being. In order to ensure that in the coming decades, food is a resource available to all, in order to protect the environment, from which man gets raw material and energy to do this, we should pay attention to what is behind the food we eat.

WWF CIVIL SOCIETY PARTICIPANT OF MILAN EXPO 2015

WWF will be taking part in the Milan Expo 2015, ‘Feeding the Planet, Energy for Life’ with a programme of events and initiatives focused on analysing the environmental impact of food chains, on their current non-sustainability, demonstrating their significance in terms of ‘footprints’ for natural systems and their impact on biodiversity in the Mediterranean and worldwide. Expo 2015 is the first universal exhibition that involves the official participation of civil society: which is why charities and NGOs have together chosen to be active at the Expo and to take the opportunity to express their views on crucial issues such as world hunger, sustainability and fairness. WWF’s journey to take part in the Expo began in 2011, when together with numerous other associations of various types (cooperation, solidarity, environmental, territorial) the People’s Expo committee was set up to support the voice of international civil society and farmers’ movements on the central themes of Expo 2015, with a special focus on food sovereignty and on environmental justice. These themes constitute a historic field of initiatives for which civil society has presented perspectives, experiences and solutions that deserve to be taken into account and to be considered within the complexity of the issues at stake.
A sustainable diet means eating healthy food, with a low footprint in terms of soil usage and water resources, with low carbon and nitrogen emissions, and one that is attentive to the preservation of biodiversity and ecosystems, that is rich in local and traditional foods, and that is fair and accessible to all.

Despite considerable advances in agriculture over the last thirty years, it is clear that current food systems continue to be largely unsustainable.

Globalisation has moved the focus from sustainability towards the intensification and industrialisation of farming and distribution methods. However, the steep rise of globalised food production has not led to the promised improvements in global nutrition. The worrying consequence of this is that today the number of undernourished people has swelled to more than a billion and at the same time obesity - and chronic diseases associated with it - has reached similar figures. If we align these figures with the alarming rate at which ecosystems are deteriorating and biodiversity is perishing, modern diets simply must be reviewed.

Current food production and consumption trends must therefore undergo radical changes, with special attention being paid to all those entities involved, and to an increase in the demand and availability of healthy foods that should be environmentally friendly, have undergone little industrial production, and are grown in the traditional regions of origin. They should respect biodiversity, available resources and local cultures.
SUSTAINABLE DIET? A MATTER OF FOOTPRINT...

To meet the nutritional needs of an increasingly urbanised population adopting consumerist behaviours, and to preserve natural and production resources with a population that is growing, food systems must undergo radical changes towards greater efficiency in the use of resources.

In order to assess the environmental impact of a certain food, its entire life cycle should be considered, with all stages of the food chain being covered “from farm to fork”.

The pressure that food production generates on the environment can be evaluated through the set of footprints that, starting from the main ecological footprint, measures the impact that certain processes have on natural resources through various aggregate indicators. The WWF has focused its attention on the calculation of three footprints that we consider extremely useful for analysing the impacts of the food system:

1. Carbon footprint, namely the amount of greenhouse gases emitted throughout the supply chain from the field to distribution;
2. Water footprint, namely the amount of water consumed or polluted during cultivation/breeding and the industrial processing phase;
3. Nitrogen footprint, namely the amount of reactive nitrogen introduced into the environment during cultivation/breeding.

These environmental pressure indicators capture three critical aspects on the impact of human activity on the environment. The impacts expected from Carbon footprint are globally significant, while the impacts of water and nitrogen footprints are very significant on a regional and local level.

Data for the environmental impact of food are potentially of interest to various parties, such as consumers, food retailers, suppliers and producers, NGOs, environmental agencies, National and regional governments.
The second biggest cause of climate change in the world is CO₂ emissions arising from the rearing of animals, that is from the large amount of meat that we consume. To reduce emissions we must cut down the amount of meat in our diets, eating mainly grains, fruits and vegetables.

For every beef steak weighing 250g, around 3.4 kg of CO₂ is emitted, the equivalent of a car with a medium-large engine capacity that travels 16 km. Production of the same weight in potatoes meanwhile produces around 0.06 kg of CO₂, which is 57 times lower than that of the steak.

It is therefore crucial that we learn to eat less meat from both an ecological and health perspective. Replacing just one meat-based dish per week with a typical dish from the Mediterranean diet would save 180 kg of CO₂ per year.

Both seasonality and the place of origin are important even in how we choose our fruit and vegetables. In fact, the production of 1 kg of out of season tomatoes releases 3.5 kg of CO₂e, mostly due to the heating of greenhouses, while the same quantity of tomatoes produced in a field in summer releases less than 0.05 kg, a whole 70 times less.

The increased movement of goods leads to a drastic increase in CO₂ emissions, as well as other pollutants. Air transport of foods such as strawberries, apples, tomatoes, asparagus, courgettes, etc. between continents can generate around 1,700 times more CO₂ emissions that a 50km journey in a lorry.
Nitrogen is essential for life as forming of amino acids, proteins and DNA. The limitation of this substance in nature placed a limit on the expansion of life on earth: plants and animals could not grow faster than the bacteria fixed the nitrogen on which they depended.

Such a natural limit also manifested itself in our societies’ agricultural sectors, where intensive use of land sometimes led to its depletion and to shortages. Just over 100 years ago, we managed to surpass the natural limit thanks to synthetic fertilisers (comprising of nitrogen and phosphorus) which allowed agriculture to obtain unimaginable yields on non-fertile land.

Today, the industry produces 120 million tonnes of nitrogen per year and the problem is that ecosystems take in more nitrogen than they are able to use, which generates imbalances in the natural cycle and widespread pollution (of rivers and seas for example). Nitrogen pollution is increasing worldwide at a rate that requires urgent action.

There are initiatives that we can take to return to safe nitrogen levels: there should be a transition towards sustainable agriculture and it is important that we individually we halve our consumption of meat and dairy products.
WATER FOOTPRINT MATTERS

Only 2.5% of all the water on earth is fresh water. Most of it (79%) is not available because it is enclosed in ice caps and glaciers. 20% of it comes from groundwater. Lakes, reservoirs, rivers and wetlands therefore make up less than 1% of available freshwater. Population growth and increased economic and agricultural development are the main reasons that are bringing about changes and the loss of river/water systems and wetlands. 70% of global water withdrawals is due to agriculture.

WATER FOOTPRINT: WHAT IS IT AND HOW IS IT CALCULATED?

Water footprint is a sustainability index that makes it possible to measure the total amount of water consumed or polluted for bringing about a finished product. It is the sum of three components and can be calculated through an international method developed by the Water Footprint Network:

- **Blue water footprint** is the volume of freshwater withdrawn from the natural cycle (taken from surface waters and groundwaters, i.e. rivers, lakes and aquifers) for domestic, industrial or agricultural purposes (eg. irrigation);

- **Green water footprint** is the volume of rain water transpired by plants during cultivation;

- **Grey water footprint** is the amount of polluted water, measured as the amount of water required to assimilate pollutants so that the water meets specific water quality standards once again.
By analysing the date on the water footprint of different foods, it has been shown that foods in the Mediterranean diet - of which a frequent and regular consumption is recommended (grains, fruit and vegetables) - have the least impact in terms of consumption of water resources. Conversely, foods of which a very moderate consumption is recommended (meat and animal derivatives) are those with the greatest water footprint.
THE IMPACT OF FOOD ON SPECIES AND HABITAT

We depend on biodiversity and ecosystems that provide essential services and among the strongly connected and interdependent ones are:

- **Water cycle regulation**: Ecosystems regulate hydrological flows ensuring the presence of fresh water. The water on our planet is always the same and the cycle allows its reuse through: evaporation, condensation, precipitation, infiltration and groundwater flow.
- **The supply of water**: the water systems of the planet, or the rivers, lakes and groundwater, are a reservoir of sweet water for all living species. Water is an essential resource for life.
- **Soil formation**: the set of physical, chemical and biological processes on the Planet leads to the formation of the soil, which occurs through the interaction between the inorganic substrate, the climate and some organisms such as earthworms, lichens, mosses and bacteria.
- **The cycle of nutrients**: the collection of processes that occur in nature thanks to which every single substance, such as carbon, nitrogen, oxygen and water essential to life is used and made available again.
- **Pollination**: is the service carried out by many animal organisms, as well as by the wind and water, which allows the fertilization of plants and also the production of food, including fruits and other materials of plant origin.
- **Adjusting the biological balance**: all living organisms are connected by a chain of relationships, such as the predator-prey or host-parasite connection, the maintenance of which is essential for life on the planet.
- **Food production**: in Nature every species, sooner or later, becomes a “food” for another. The first crucial step is carried out by plants that are able to utilize the energy from the sun to produce nutrients for all the other organisms of the food chain.

Biodiversity is, however, increasingly threatened by the pressure exerted by a rapidly growing world population and the degradation of natural systems. Wild species are severely endangered if the habitat in which they live are destroyed by pollution, urbanization, deforestation and monocultures. This destructive process can be accelerated by a mismanagement of agriculture, forestry and fishery resources.
Agricultural biodiversity is represented by an innumerable amount of species that serve to nourish and treat humans. It is found in the huge variety of crops and animal species with specific nutritional characteristics, in breeds of livestock that have adapted to harsh environments, in insects that pollinate the fields and in the micro-organisms that will regenerate the soil. Biodiversity is at risk, even among the cultivated and farmed species: the FAO has estimated that by 1900, about 75% of the genetic diversity of world agricultural crops had been lost.

The diversity of ecosystems and species is, today, more and more subject to pressures exerted by our rapidly increasing population, that is consuming more and more, that is fundamentally changing and that is degrading the environment. Many wild species are at risk of extinction due to unsustainable management of agriculture, livestock and fisheries.

In Thailand, the removal rate of mangroves is probably higher than any other type of forest in the world. Among the main causes of this deforestation is the rearing of shrimps, the most precious marketed sea product in the world. In Indonesia, Malaysia, the Amazon and the Cerrado vast swathes of forest are being destroyed to produce important raw materials on domestic and international markets, such as palm oil, coffee and soya.

WWF is working to create more sustainable global supply chains through the development and application of farming methods, the management of fishery resources, agriculture, forestry based on respect for biodiversity, natural equilibria and the rights of local communities threatened by irresponsible production systems. One example is promoting the ASC (Aquaculture Stewardship Council) certification of shrimps for aquaculture supply chains, that guarantees to consumers that fish products have been produced in a responsible way.
THE MEDITERRANEAN DIET: SUSTAINABLE FOOD

The Mediterranean diet is rich in biodiversity and nutritionally healthy. It is acknowledged as one of the healthiest diets, for the variety of its cultural heritage, for its biodiversity and for the value of the nutritional well-being associated with it.

The concept of the Mediterranean diet transcends its pure value as a diet as it also represents a sustainable means of production that is recognised by UNESCO as being worthy of World Heritage status. Our diet is after all intrinsically linked to our culture, to our customs, traditions, history and economy.

The traditional Mediterranean diet is rich in plant foods (grains, fruit, vegetables, nuts, seeds and olives) and has olive oil as its main source of additional fat. It provides for a moderate to high intake of fish and shellfish, a low to moderate consumption of eggs, poultry and dairy products (cheese and yoghurts), a low consumption of red meat and saturated fat, and a moderate alcohol intake, mainly in the form of wine during meals.

The distinctive feature of this dietary model is not just the range of foods but also how sustainable they are: they are mainly fresh, local and seasonal produced, prepared according to traditional recipes, and that also express the values of the environment and the landscape in which the food is produced and consumed.

AGRICULTURE IN ITALY: From the data of the 6th General Census of Agriculture in Italy, there are 1,630,420 farms and livestock enterprises in operation, of which 209,996 rear livestock destined for sale. Overall, the Total Farm Area (TFA) amounts to 17,277,023 hectares and the Utilised Agricultural Area (UAA) amounts to 12,885,186 hectares. In ten years the TFA has decreased by 8% and the UAA by 2.3%. The animals that are being reared include 5.7 million cattle, 9.6 million pigs, 7.5 million sheep and goats and 195.4 million poultry. The average size of a farming business has grown, in a decade, from 5.5 hectares of UAA per business to 7.9 hectares (+44.4%).

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ACTIVITIES

The following activity sheets start with an introduction on a specific topic, around which the teachers can organise some didactic work for the class. This can either be an open discussions on the topic, or working on the suggested activities in each section, going back to the main subject afterwards, and sharing the experience gained through the activities.

APPLES
Sensations related to food

BISCUITS
Always read the label

HAMBURGERS
The carbon footprint of food

BANANAS AND PINEAPPLES
Fruit from another world

TOMATOES
The water footprint of food

STRAWBERRIES
Tastier if not from a greenhouse

PRESERVES
Chemicals on the plate

SNACKS & DRINKS
Packaging

VEGETABLES
Organic garden

MILK
Short supply chain

THE RUBBISH BIN
Food waste

All the cards are taken from the environmental education booklet “Within the limits of one planet” n°70, ED. WWF 2012 and from “Within the limits of one planet” n°71, Ed.WWF 2013.
APPLES
SENSATIONS RELATED TO FOOD

Apples are one of the most grown and eaten fruits in the world. For its colour, taste, smell, shape, dimensions, the features of its skin, its flesh so firm, crumbly, crunchy; we can find over 20 varieties on the market, while in the zoological gardens or countryside we can still find some varieties now commercially “extinct”.

To gain their colour, apples need hot days and cold nights, and it's for this reason that their colour change quickly in the autumn, when the temperature at night is cooler and the days are still very warm.

Educating the taste

Educating the taste is extremely important in order to make good use of our first tools of knowledge: our senses. This also reduces the risk of a boring, non-varied diet, and allows us to evaluate the quality of the food we are presented with.

Some studies state that among the senses involved with eating, taste only gets 20% of the merit, while 80% of the flavour comes from the sense of smell. There are also thermal and tactile receptors, which give us information on food temperature, on its shape and compactness. Through the sight we appreciate the appearance and colour of food, and even the noise we make while chewing has an effect on our perception of taste.

Taste can change also with age: when we are little we seem to prefer sweet and soft food, while as adults, crunchy and savoury food seems to be more interesting. The sense of smell and taste can vary from person to person, but everyone needs to practice these abilities in order to become more open-minded towards all types of flavours and food.

If we eat without paying attention to our sense perceptions, or if we eat too fast, we can lose satisfaction in the taste, and in the long run this might lead to a loss of our ability to grasp the taste, and the traditional flavours of our culture might slowly fade away.
**Apple sommelier**

Find some popular varieties of apples (Golden Delicious, Granny Smith, Gala, Empire, Russet, etc.), one of each variety for every 2 pupils.

Students sit in pairs, one in front of each other. Every pair gets a plate, a knife and one apple of each variety. Every apple needs to be recognised, observed, cut in half, smelled and tasted by each pair. After this, one student blindfolds the partner, and asks him to taste all the apples again to see if he can recognise the varieties (the student will note down correct and incorrect answers). How many can they recognise? Then they swap roles. At the end there will be a table of all apples. Who was the best apple sommelier? Which variety was easier to recognise? What qualities have made them more recognisable? Note: the same activity can be carried out with different types of fruit (pears, plums etc.); try to discover old varieties you cannot buy anymore. Also, the same can be done for honey, bread, lettuce. This type of activity based on one single sense and one given fruit can be extended to other senses and materials: once all data has been collected and classified, we will have a representation, even if only partial, of the perceptive richness of our reality.

(This activity and some of the thoughts on education and senses included in this paper are taken from: Ambiente in tutti i sensi, Quaderno di educazione ambientale WWF n. 61, 2007)

**An apple is a treasure**

Italy is one of the biggest European producers of apples, with orchards situated mainly in specific regions. The most popular varieties are golden delicious and red delicious, the rennet, with its compact and slightly sharp pulp, the annurca apple, with its crimson colour; the limoncella apple, yellow with its tart pulp, and the granny smith apple, light green. However locally and especially on the local stalls of farmers markets, one can find local varieties strictly linked to the territory. Propose an activity with a treasure/apple hunt, trying to pick and taste all local varieties you can find. For each type you can also look for its presence on the territory (history, traditions, stores, areas of farming, and even any possible producers and promotion association, etc.).
Always read the label
BISCUITS
ALWAYS READ THE LABEL

Food labels always give us so much information. Let’s take as an example the biscuits we eat at breakfast or during the day.

What’s on the label?

The label of a food product is its identity card: it gives the consumers the information that allows them to buy safely and consciously, and also it exactly describes its main features.

However it does sometimes happen that on the label we find information that we can’t easily decipher.

What can you find on a label?

- **Registered name**: information on physical conditions of the product, or on the specific process it has gone through.
- **List of ingredients**: all ingredients must be listed in weight descending order, and potential allergy-provoking ingredients must be specified.
- **Quantity**: the indicated quantity must be of net product, measured in volumes for liquids and in mass for all other products.
- **Expiry date, preservation and use methods**: the ‘Use By’ indicates the date after which a product shouldn’t be consumed because it might cause food poisoning. The ‘Best Before’ date indicates the time after which it is not dangerous to consume a product, but its taste and consistency might have been lost.
- **Origin**: indication of the country or region of origin is compulsory for certain categories of products such as meat, fruit and vegetables. The full name and address of the producer, the packaging plant or the import company must be clearly indicated on the outside packaging.
- **Details on additives**: if a food additive has given the ‘E’ abbreviation followed by a number, it means it has been approved and can be used in all the European Union. This approval is controlled, reviewed and modified on the basis of up to date scientific data.
- **Other information can also be added**: if the product is organic, if it contains GM ingredients, or its nutritional value.
Not only ingredients

Reading the labels can also help the comparison between similar products and to check price per kilo. Getting accustomed to read the labels also help us ‘explore’ the areas where we can find information about the products we are about to buy. For example, at the fishmonger stall we can find out more about the sea of provenance of the various seafood products, and information on whether they are fresh or frozen. For many ready-meals such as bakery and pastries sold in the supermarkets, there’s always the list of ingredients available in the proximity. Even fresh fruit sold at the market, which doesn’t have a label, can tell us something about itself thanks to the information printed on the boxes or the price tickets displayed by the seller.

Are they all the same?

Find labels of the same products sold in different countries (ask the help of a friend who has been in other countries, or who eats products from his country of origin). Biscuits, soft drinks, cakes and jams would do. Get some help to translate the list of ingredients, and comparing the various products, check if the ingredients match. In some cases the country legislation allows to omit an ingredient, or on the other hand it might require to provide additional information related to the food or to the packaging, or also on how to dispose of that packaging.

The perfect label

Try and invent your own ‘perfect’ label, the one which in your opinion is complete from all points of view (while also taking into account all the legal obligations we discussed in this chapter), adding to the basic details some information (try to explain this in a simple and direct way) on how much nature (water, resources, energy, etc.) is in that product, how much nature was used to produce it, and how much will be needed to dispose of it. Bear in mind the production chain, as well as the chain of all the packaging, and its supply and distribution.
HAMBURGER

The environmental footprint of food
HAMBURGER

THE ENVIRONMENTAL FOOTPRINT OF FOOD

Today the hamburger is the most popular fast food in the planet, on the same level as pizza. The most common versions are those enriched with cheese, bacon, fried eggs. Hamburgers are among the most criticised fast food because of beef high impact on the environment.

Let’s talk about the oil which moves the tractors in the farms, or the oil used to produce chemicals used in the production of the food feeding the cattle producing the mince. one should also be aware that also an huge amount of water is required for the production of the fodder that also need an enormous area of land to be grown. The production and distribution of one hamburger need a huge amount of fossil fuels, coming from sectors with a high mechanization; as it is for instance the long chain of refrigeration.

And what about the digestive processes of the cows? As well as manure, cows produce a vast quantity of methane, a greenhouse gas even more powerful than carbon dioxide: around 110 kg per year per cow. One kilo of methane has the same effects on the climate of 23 kg of carbon dioxide.

Finally, it is important to consider that the production of cheese and bread produces CO2 emissions that need to be counted.

EVALUATING THE FOOTPRINT

There are many websites which help calculate our footprint, also showing the links to food. On WWF Italy’s website http://www.improntawwf.it there are two useful tools that can be used to calculate the footprint of our lifestyle and the footprint of our weekly food shopping, inclusive of the hamburgers.
MEAT CONSUMPTION

One of the foods with the highest footprint is beef. Suggest a research on the quantity of beef (and the different types) consumed every month by the students. Calculate the relevant carbon footprint or the water consumption; compare this data with the Italian average, then evaluate the percentage relevant to your consumption of meat. Identify possible solutions to reduce all impact relative to meat consumption.

FAST FOOD?

Suggest a research on how many meals the students eat in fast food joints. How many hamburgers are eaten in a week? What are their effects on the environment? Are there any solutions to reduce these effects?
TOMATO
The water footprint of food
TOMATO
THE WATER FOOTPRINT OF FOOD

Italy is one of the main producers of tomato in the world (and the first in Europe). It is also the top country for tomato-based product exports. It can boast of a long tradition of production of tomato sauces. The first manufacturers started in the second half of the 19th century around the slopes of Mount Vesuvius with the production of the first tinned tomatoes, which were exported especially to Great Britain and consumed by the miners to fight silicosis. Gradually other products were introduced such as tomato puree and, only in recent times, passata and tomato sauces.

As for many other vegetables, tomatoes too need water to grow. WWF, as we have seen in the introduction, has identified water footprint as a compelling tool to evaluate the total quantity of water used - and polluted - in production processes and consumer goods, especially food. They have also funded studies and analysis to increase awareness on how and where this precious resource, water, is used.

THE WATER FOOTPRINT OF FOOD

The biggest volume of the water consumption of a family is in the food we eat. Plant foods, as legumes, cereals and vegetables require less water than animal foods as we eat them directly. Beef, pork and other meats need large volumes of water used for their production, and that is due to the vegetable food that livestock eat. Of course, the cultivation of field crops that are eventually fed to beef cattle require huge amounts of water.

For example, the volume of water required to produce a tomato is 13 liters of water, a slice of bread requires 40 liters, 100 g of cheese uses 500 liters and 2,400 liters of water are required for an hamburger.

More generally, the water consumption for daily food varies from about 1.500 to 2.600 liters in case of a vegetarian diet, and about 4.000 to 5.000 liters for rich meat diet. It follows that a water-intensive diet, too rich in animal fats and sugar, is negative not only for our health but also for Water Resources of the planet.
THE COLLABORATIVE PROJECT ‘MUTTI’ - WWF ON THE WATER FOOTPRINT

For several years now an innovative project on natural resources usage has been developed for a key Italian agricultural production chain: tomatoes one. The collaboration between the WWF and Mutti - a leader in the production of chopped tomatoes, puree and passata - has made it possible to evaluate and establish targets for reducing the water footprint for an entire chain of production, from growing tomatoes, to processing them in factories, to the packaging of the finished product.

The results, developed with the support of CMCC (Euro-Mediterranean Centre for Climate Change), show how the water footprint of the supply chain of raw materials accounts for 98% of the total, with 84% coming from growing tomatoes. The factory phase contributes only to 2%.

Mutti has voluntarily committed with WWF to a project to reduce the water footprint (-3% by 2015), through measures designed to improve the efficiency and effectiveness of field irrigation and to reduce the use of fertilisers.

With the support of contributing farms a trial has started and is annually renewed, for an innovative service of irrigation management with the objective of limiting the use of water only to volumes and times required. Thanks to tools for monitoring soil moisture, it has been possible to determine the exact irrigation requirements of the tomato, saving 14% of the water on average. The saving on the volumes of water used in irrigation ultimately results in a reduction of the total water. With annual monitoring the calculation is updated taking into account the climate regime and agricultural practices.

Additionally, in support of farmers, educational meetings are organised, specialist and technical assistance on irrigation. The experience of Mutti demonstrates how through these actions it is possible to reduce the impact of a strategic sector such as agriculture, making the production process more consistent with environmental objectives always measurable and tangible.

LET’S REDUCE THE WATER FOOTPRINT

Imagine you need to prepare a dinner for a few guests. After you calculate the water needed to cook all the food you have planned (refer to the data in this sheet or go to the water footprint calculator at www.waterfootprint.org), try and list some alternative dishes you can cook with a smaller water footprint.

On WWF Italia website http://www.improntawwf.it/carrello/ you can find a tool to calculate your weekly shopping’s water footprint.
BANANAS & PINEAPPLES

Fruit from another world
Bananas’ commercial history starts towards the end of the 19th century with the foundation of United Fruit Company. For most part of the 20th century, bananas and coffee dominated the export markets from Central America. In the 30’s they contributed to 75% of the whole volume of regional exports. Later in the 60’s the two products totalled 67% of the region’s exports. Today bananas are the eighth most relevant agriculture commodities with a total of 17 millions of tons traded yearly.

According to the data from FAO, the biggest world producer of bananas is India, followed by Brazil, Ecuador, China and Philippines. The world trade is dominated by Ecuador (nearly 30% of the whole exports), followed by Costa Rica, Philippines and Colombia. In total these 4 countries represent the 2/3 of the world exports of bananas. The biggest importers are USA and Europe: together, according to FAO, they consume 27% of the world’s import of bananas. Latin-American countries mainly supply the USA and European markets, while Philippines are the main supplier of Japan.

**MONOCULTURE**

Bananas are usually grown in large monocultures. We refer to a monoculture when large areas of farmland are dedicated to a single product, mainly aimed at export. It was a result of colonialism, and from the 18th century it created whole new geographical areas. An example of monoculture was the cotton plantations (Egypt, Central Asia, East Coast American states); pepper (West Indies); cocoa (Mexico, most part of Latin America and Caribbean Islands, Ghana, some areas in Indonesia); sugar cane (Antilles); coffee (East Africa, Yemen, Colombia, Brazil); tea (Northern India, Sri Lanka); bananas and peanuts (tropical Latin-America and tropical Africa), pineapple (Costa Rica). monocultures are among the most relevant drivers of biodiversity loss.
THE PINEAPPLE CASE

According to a study co-produced by the European Union and by the British newspaper The Guardian, there is documented evidence of the conditions of exploitation and poverty of the workers in pineapple plantations, as well as the effects on their health due to massive use of pesticides and chemicals.

An agronomist from Costa Rican University has explained the chemical processes necessary to all monocultures to produce perfect fruits ready for the shops. “Pineapples need a high quantity of pesticides, around 20 kg of active ingredient per hectare per cycle. The land is sterilised, the biodiversity is lost. Generally between 14 and 16 types of treatments are executed, and repeated several times, using chemicals which are dangerous for the environment and human health”.

Thanks to these chemicals, production has increased by 50% since 1998, but the substances they use, which are legal in Costa Rica but debatable in the rest of the world, have already compromised the plantation’s aquifers and worsen the difficult living condition of the population in the area. The effects on health are worrying: last set of analysis ordered by the government show 22 different contamination agents. The lowest is the price we pay for this fruit in Europe, the highest the price the Costa Rican producers (and dozens other countries) will have to pay.
LET’S GO BACK TO BANANAS: FAIR TRADE

What makes a bunch of bananas a Fair Trade product? Fairness of bananas is guaranteed though legally certified predicts which support the producers according to social and environmental criteria. Conditions of work are verified: the producer must guarantee his workers an equivalent or higher retribution than the minimum determined by law; they are allowed to form cooperatives and have the right to collective negotiations. Health and safety laws must be guaranteed. Hard labour and exploitation of child labour are banned: no one younger than 15 is allowed to work. Basic union rights must be guaranteed, such as maternity, health care, access to property and education. The environment is protected too. The plantation must not expand to the detriment of virgin forests, nature reserves, lagoons, and water springs. Agriculture processes must preserve and improve the soil structure so that it stays fertile longer and resistant to water erosion. Water reserves must be protected by pesticides pollution: the most dangerous (classified by the World Health Organization and Pesticide Action Network) are banned alongside weed killers. The management of plantations following these rules is more costly than usual.

Fresh fruit production is an area where Fairtrade can make a difference. The international market is very complex, plus the European and American markets require protection quotas and access fee systems, as well as a high quality production. Usually fruits are shipped weekly, and in order for it to arrive fresh and desirable in the shops, a sophisticated logistics is needed. This means very high production costs, which can only be sustained by cooperatives of producers, and it also makes it very difficult for small farmers to successfully compete with the big companies dominating the international markets. The majority of the world trade of bananas is in the hand of 5 multinationals, which control the near totality of the market. This allows them to influence prices and, in part, to create the rules of the game.

Today ‘fair’ bananas are produced in 6 countries: Ghana, Ecuador, Dominican Republic, Colombia and Costa Rica.
THE JOURNEY OF A PINEAPPLE

From the information found at the supermarket or on the label, find out the origin of a pineapple. Try to track on a world map the journey of your pineapple, from the plantation to your table. Compare this with the journey of other products, including those grown locally.

AT THE SUPERMARKET

Plan a visit to the supermarket and compare the price per kilo of seasonal local fruit against that of bananas or of pineapples: what’s the difference in price? Start a discussion with the students. Observe how many fairtrade products are displayed. Have they got the same visibility of the bigger brands? Have they got a different price (per kilo / litre, etc.)? You could also interview the store manager to understand the commercial choices of the business.

AT HOME AND AT SCHOOL

Are there any families who buy fairtrade products? Are there any who buy directly from the fairtrade producers or markets? Find out if the school canteen buys and offers fairtrade products. If that is not the case, try to promote their introduction.
STRAWBERRIES
TASTIER IF NOT FROM A GREENHOUSE
STRAWBERRIES
TASTIER IF NOT FROM A GREENHOUSE

IS IT NECESSARY TO EAT THEM ALL YEAR ROUND?

Nowadays consumers buy according to what they find on the stalls and according to what the large scale retailers offer; that is, everything and always. It is also for this reason that we don’t know anymore the seasonality of each product, and can only guess they are out of season by reading about their provenance on the label. For several years, for example, every variety of tomatoes, courgettes, cauliflowers and green beans has arrived in our houses all year round, and we don’t even ask how this can be possible. Thanks to greenhouses and imports we have stopped making the connection between food and seasons.

GREENHOUSES AND UNNECESSARY WASTE

There are some producers of greenhouse vegetables who dispose of these products as soon as the vegetables in the fields start ripening; therefore, greenhouses that house summer produces tend to have a production peak during the winter, and then slow down in the summer when we approach the natural ripening time. Tomatoes are a good example. The ones grown in greenhouses are sold between April and mid-June, until there is a profit for the producer; but as soon as the tomatoes ripen in the field and prices start going down, the producers will let the tomatoes rot in the greenhouses: harvesting would only be an unnecessary cost!

STRAWBERRIES OR CHEMICALS?

As for first fruits and vegetables grown in greenhouses, this is an unnatural agriculture with a high usage of fertilisers based on nitrates which, once in our bodies, can become nitrites, a substance very dangerous for our health. In the same way the unnatural growth weakens the plants and makes it easier for parasites and diseases to attack them. In order to get rid of them, pesticides and fungicides are used, which might remain on the products even after the harvest, alongside preservatives used to keep them fresh for longer.
SEASONS IN THE KITCHEN

Does the school canteen offer seasonal dishes? And your family at home? Try to collect (or create them yourself) recipes using exclusively seasonal products.

CALENDAR OF FRUITS AND VEGETABLES

Find a calendar showing seasonality of vegetables and fruits. Organise a visit to the supermarket to identify products available according to the seasons. Put the results together and discuss with the students.

<table>
<thead>
<tr>
<th>JANUARY</th>
<th>FRUITS</th>
<th>VEGETABLES</th>
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<tbody>
<tr>
<td>FEBRUARY</td>
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<td>NOVEMBER</td>
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<td>DECEMBER</td>
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Preserves

Chemicals on the Plate
Preserves
Chemicals on the plate

Open the kitchen cupboard. How many preserve jars are there? Unless these are homemade products, let’s take a look at the label: it’s impossible not to find additives in preserves, fruit juices, sauces, baked products, sweets, etc. It’s certainly worth trying to clarify the subject.

Food preservation

Food preservation started as soon as men learnt to store their harvests, and utilise salts and smoke to preserve meat and fish. Today preservation needs mainly chemical additives to preserve or ‘improve’ the product. In the past perishable items could be stored in brine, salt, oil, vinegar, in fat, dried or smoked. These preservation methods have been used for thousands of years, and they are still valid and have allowed human beings to survive up to today.

Food additives

Chemical substances play a major role in the production and distribution of food. For example when used as additives, they extend preservation of food, and when used as colourings or flavourings, they can make food more desirable. Other chemical substances are pharmacologically active and are used to fight diseases in breeding animals and farming. The advantages of using chemical substances in the production and distribution of food are on the other hand counterbalanced by potential risks for the human health and environment, because of side effects and residues of these substances.
IN WHICH FOOD?

Food is divided in three groups: those that can be prepared with more than one type of chemical additives; those than can only have a few; and those that can’t have any at all. Among the latter we find non-processed food (with a few exceptions); frozen food, honey, olive oil, pasteurised and UHT milk, plain yoghurt, mineral water, coffee and tea, sugar, dried food pastes. In some cases, additives are natural ingredients such as citric acid (acidifying substances and antioxidants), lecithin (emulsifier), pectin (thickener) and vitamins.

THE INITIALS ‘E’ FOUND IN LABELS

The initial “E” found in labels indicates the presence of chemical additives approved by the European Union.

- **Antioxidants**: extend the life of food. For example vitamin C, also called ascorbic acid or E300.

- **Colourings**: used to replace the natural colours or to give an appropriate colouring. For example, caramel: (E150a) often found in balsamic vinegar.

- **Emulsifiers, stabilisers, thickeners and gelling agents**: lecithin (E322), for example, help mixing ingredients such as oil and water. A gelling agent commonly used (in jams) is pectin (E440).

- **Flavour enhancers**: they enhance the flavour of sweet and savoury food. For example: monosodium glutamate (E621), often added to soups, sauces and sausages.

- **Preservatives**: they prevent food decay. A few examples: sulphur dioxide (E220) to stop mould and bacteria forming on dried fruit; nitrites and nitrates (E249-E252) for meat and cold cuts.

- **Sweeteners**: used to replace sugar in soft drinks, yoghurts and chewing-gum. For example: aspartame (E951), saccharin (E954) e acesulfame-K (E950).

For the internet research it is recommended to begin with institutional websites such as European Food Safety Authority
HOMEMADE PRESERVES

In the past this used to be a very common activity: fruit preserved in alcohol, pickled vegetables, tomato sauces, dried mushrooms and salt fish, chestnuts, etc. Every home would make preserves. But what about today? Gather information on the preserves still ‘alive’ in your family. You can also put together a recipe book.

A LONG, LONG LIST

Find a dozen food containing additives. List all the additives which you can find on the labels. How many did you find? Can any of these substances be found in more than a product? Find information on all known additives (characteristics, usage, effects, possible toxicity etc.), and prepare a guide to share with your family at home.

WHO HAS GOT MORE?

Find various packs – of different brands – of the same product (for example a ready-made sauce, a cake with cream, a jar of chocolate spread etc.). Compare these products to identify the brands which contain the highest (or lowest) number of additives.

“E” FOR…?

The letter “E” (E stands for Europe) followed by a number identifies the substances added to food. Do a research (there are several website online with the full lists) on additives “E”: what do they correspond to? What are they used for? Can they be dangerous for our health? Could we do without them?
Sweet Snacks and Soft Drinks Packaging

Packaged cakes and sweet snacks are a product of modern eating habits, for children and adults, and are generally eaten at breakfast or as a snack during the day. They are consumer goods whose popularity has been facilitated by how easy to transport and store they are.

Cakes with their coloured and attractive wrappers are a good starting point to discuss food packaging.

Apart from a few exceptions, all products on the market are wrapped and packaged. Packaging has become an integral part of the product, and has created important effects on society. Indeed the introduction of packaged food has revolutionised the food habits of modern industrial societies, increasing the shelf life of products, simplifying their transportation and allowing the distribution of different varieties of products for sale.

If primary packaging is needed to protect and preserve the integrity of the product (for example, tin cans for preserves or bottles), many additional packaging nowadays only have a marketing function, pushing the consumer to buy a product rather than the other. All this has meant an increase of packaging volumes, which have created several problems to the logistics and have negative effects on the environment.

Canned Soft Drinks

The tin can is a container, generally for food products, which can be constituted by different metal materials such as aluminium or tin (hence the word ‘tin can’), that is a tin-plated iron sheet combining the strength of iron with the anti-corrosion qualities of the tin.

In Italy around one billion and 700 million tin cans are used every year: on average every citizen uses 29 per year. Unbeaten champions for usage of tin cans are the United States, with 265 tins per person per year. However the Americans are also champions at recycling: 55% of tins are recycled thanks to the introduction of a refundable deposit, the Bottle Law, which is applied to all tin cans and glass bottles.

Aluminium has certain characteristics which have made it indispensable in the packaging sector: it can be in fact recycled over and over to create brand new products. Recycling aluminium, in addition to reducing the amount of waste, offers big savings. This is not just because one can save up to 90% of the energy required to produce it from the raw material, but also because thanks to its large use and high cost as raw material, it is more convenient to recycle it from any type of waste. Recycled aluminium is therefore a very valuable financial resource for the economy of a country. In Italy for example its recycling has allowed to reduce annual import of this mineral by 30%.
**HIDDEN WEIGHT**

The hidden weight of a product is given by the natural resources used to create it, and by the waste resulting from its production and processing.

Every year every European citizen produces around 500 kg of domestic waste. In addition 3500 kg of industrial waste are needed to produce all the goods they utilise, 16.000 kg of raw materials, and 50.000 kg of natural resources such as water, sand, coal and oil.

The usage of natural resources and production of waste are just two sides of the same coin and derive from our lifestyle, our spending and consumptions, but also from the methods we use to produce goods. Everything we use requires raw materials to be produced. And it will inevitably become waste in a long or short time frame.

At world-wide level it is estimated that the extraction of raw materials will exceed 100 billion tons by 2030.

The use of resources, emissions of pollutants, the disposal of goods when they become waste, these are all factors which should be included from the beginning in the financial estimate of a product. Current legislation usually tends to charge this cost to manufacturers (also called “manufacturers’ liability”, which follows the “polluters pay” concept), so that the final price of a product also includes its ‘hidden weight’.

However at the moment these costs are not really included in a product’s price, but are still charged to the community (for example through the waste disposal tax). When thinking about an object, even a cheap one, it is then important to consider that vital natural resources of our planet have been used to produce it, and sooner or later it will inevitably become waste to be disposed of!

An ecological backpack is the ‘nature weight’ carried by every product or service (like an invisible rucksack). This indicator is basically the weight of the materials taken from nature to create a product or service. It is generally indicated in kilos of nature per kilos of product, or kilos of nature per product unit.

A few examples: the production of a car weighing 1 ton uses up to 25 ‘nature’ tons; a motorbike of 190 kg uses 3 ‘nature’ tons. A laptop weighing 2.8 kg uses approx. 400-600 kg; a 5 grams golden ring uses 3 tons. To produce one kilo of paper we use 15 kg of nature, for one litre of orange juice (in a carton) we use 25 kg of nature.

Generally speaking the more precious, refined or transported an industrial product is, the heavier is its ecological backpack.
Calculating a product’s ecological backpack can be extremely useful to understand the effective impact of that product on the environment; however, in order to make that calculation even more reliable, we need to refer to its usage as well. For example, if a car travels during its lifetime 200,000 km, its ecological back sack would be 125 grams per km; if the travelled kilometres are 400,000, its back sack is halved to 63 grams per kilometre. To the ‘production’ ecological back sack we also need to add its ‘usage’ back sack due to fuel (16,000 litres per 200,000 km), maintenance and spare parts.

If we analyse in depth the life of a product and we consider every single raw material and resources needed at every level and phase of its production, we can estimate more thoroughly the effective impact it has on the environment.

The phases of the life cycle we analyse are:

- **Production**, which includes supply of raw materials (in many cases extraction of minerals) with all the processes involved; manufacturing of intermediate products needed to the creation of final products; transportation and sale;
- **Usage**: all effects of the product’s activity need to be considered, including its maintenance, and any transportation after the sale;
- **Disposal**, including transportation, storage, and combustion processes etc.
- **Recycle**, if possible to take place.

**MANY COLOURED DRESSES**

Products for sale in shops or supermarkets are often wrapped in colourful and eye-catching packaging, irresistibly attracting the consumer. At the same time they are actually useless and destined to end up in the bin. In most cases most products are wrapped in oversized packaging when compared to the actual content (half-empty boxes, wrapped in more than one layer of materials, packaged in small portions, gift wrapping etc.). It is estimated that about 1/3 of our rubbish is made of disposed packaging: thousands of tons of useless waste, which is not only uneconomical, but it also constitutes a serious problem for the environment. Yet the choices the consumers make, and therefore each and every one of us, can play a major role in changing this trend.
MEASURES YOU CAN ADOPT IN ORDER TO REDUCE PACKAGING

- Use packaging only when needed and reuse, where possible, previously used containers;
- Choose sustainable packaging, made with recycled and recyclable material;
- Avoid products with clear over-packaging or with multi-layered wrapping: the weight of what we buy is the one clearly indicated on the label;
- Always go for loose, unpacked products (for example with fruit and vegetables) or those sold on tap: by doing this you only pay for the product, saving on the costs of packaging which can be as much as 40%;
- Choose concentrated products and eco-refills;
- Avoid single dose products, in single portions or small packets;
- Empty all packaging and make them as compact as possible before disposing of them. Even a smaller rubbish bin represents a small saving!

How much packaging?

Among the food products at home there are certainly someone wrapped in a single pack, and also others with one or more wrappers. Do a research to create a classification with the products with the highest layers of wrapping. Create a table when all the details are collected and discuss on the real necessity of the packaging, and its function: protection, advertising, to increase the volume of the box, etc. You can also compare the difference in volume and / or weight between the packaging and the product it contains.

New ideas

Are there any food products which could have a different ‘dress’, with less packaging and made with environment-friendly materials? Ask your student to create new packaging for food they consume regularly.

A new label

Try and invent special labels for food products which show details of hidden costs. For example you can show the quantity of CO2 emissions linked to transportation, or the energy absorbed by the product during the manufacturing cycle, or the quantity of water in the products’ water footprint. The new ecological labels can be part of an exhibition at school.

Data for these researches can be found online, for example www.improntawwf.it and www.oneplanetfood.info.
VEGETABLES

Organic garden
VEGETABLES
ORGANIC GARDEN

29% of all vegetables purchased in Italy are fresh, while 32% is stored. The journey of a product from the producer to the consumer can have up to 8 steps, resulting in price increase for the final product, and energy waste often higher than necessary.

The production chain for fresh fruit and vegetables start with the manufacturers, moves on to cooperatives and stockists who sort and deliver the products to the wholesalers and agriculture markets. Here the distribution to retail channels begins, which goes through the large retail consortiums (supermarkets, superstores and discount stores), or through the traditional small-scale retailers such as the local grocery shops.

The cooperative of direct farmers Coldiretti has found that the price of peaches bought in retail is divided as follows: 24% is the farm gate price, 36% is the wholesale price and 40% is given by retailers.

On the other hand the farm gate price of lettuce only represents 16% of the final retail price, while the wholesalers contributes with 40% and retail with 44%.

Also the chain of grains and wheat products can be made of up to 8 steps: it starts with the grain farms, through grain cooperatives and stockists, mills, bakeries and pasta factories, to finally end in supermarkets, discount and traditional stores. Pasta is a product derived from wheat; 9% of retail price is the cost of grains, and 91% is the costs of the production chain. Pasta represents 26% of what Italians spend for grains and grains products, while bakery products are about 40%.

THE JOURNEYS OF VEGETABLES

In Italy the journey of fruit and vegetables can vary according to the geographical area and the product. The structure of the chain will inevitably affect its price. For apples, pears and kiwis for example the chain is fairly short, only consisting in a few phases during the sale. In these cases it is observed a good organization of the agricultural phase, which will determine a stronger negotiating power for the producers.
On the contrary there are longer chains where the number of phases is higher, as it happens in citrus fruit, grapes, and vegetables, whose chain have several roles: producers, pickers, stockists, packagers, private business operators, agents etc.

**DIRECT SALES**

They are called ‘Farmers’ Market’ and they are the points of sale where the consumers can buy directly from the farmers. Direct sale shortens the production chain resulting in big savings for the consumers; it also guarantees the freshness of the products, which arriving from local producers, means they can be on our tables very quickly.

The short chain encourages the meeting between demand and supply, adding value to the market of local products. In addition, by avoiding long journeys for the transportation of the goods, we can indirectly contribute to the reduction of air pollution and greenhouse gas.

The new trend to create vegetable gardens in the city areas is now an increasingly wide spread reality. According to the data collected and communicated by Coldiretti, in Italy 4 in 10 people have their own vegetable garden, and even sales of garden tools have seen an increase of around 50%. To look after our own garden is an excellent antidote to the economic crisis and the high cost of living: a 100 sq. m garden can provide enough for the needs of a family of four people.

American town planner Richard Ingersoll has created to this effect the new expression “civic agriculture”, which means “agriculture in urban spaces through the active participation of citizens”. In a few words, this is what happens now in many Italian cities, where public notices are issued though which collective gardens are allocated.

It is calculated that if at least 30% of urban areas were to be designed for gardens and allotments, we would see a significant reduction of pollution gases. And of course there are many more advantages of farming in urban areas. For example: reduction of transport costs of agricultural products and therefore of pollution (food and vegetables are produced and consumed in the same area, therefore are ‘zero miles food’); increased production of oxygen; reduction of fine dusts and increase of urban biodiversity.

If placed on the balcony or on the roof, the garden also helps reduce noise pollution. In the garden one can easily grow herbs (thyme, rosemary, sage), tomatoes, peppers, aubergine, mint, lettuce, beets, small fruit trees, green beans and beans. It is not necessary to have too much space, only a few meters are needed.
VEGETABLES TO GROW IN THE SCHOOL GARDEN OR IN A POT

Schools can start gardening from September, sowing plants that are resistant to cold. These will be ready to harvest in May, June and July. The times of sowing and harvesting we have indicated here may vary from year to year depending on the climate and the geographical area. For more details follow the instructions printed on the seeds packets and on the websites of seeds producers.

**A** Plants resistant to frost

**D** Delicate plants, they will not survive to frost

### MARCH

<table>
<thead>
<tr>
<th>Vegetable</th>
<th>Growth method</th>
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<tbody>
<tr>
<td>Carrots</td>
<td>R Sow sparsely in sandy soil</td>
</tr>
<tr>
<td>Lettuce</td>
<td>R Sow sparsely in rows. From end of March every 3-4 weeks. Harvest when the leaves reach 5-6 cm; it will be possible to harvest 2-3 times. Also possible to grow in pots.</td>
</tr>
<tr>
<td>Onions</td>
<td>R Sow sparsely among other vegetables. Harvest when needed and sow again in July. Also possible to grow in pots.</td>
</tr>
<tr>
<td>Peas</td>
<td>R Sow in a circle with supports. Protect from birds. Also possible to grow in pots</td>
</tr>
<tr>
<td>Potatoes</td>
<td>R Sow from mid/end of March, 15cm deep. For both plants in containers and in the field cover the leaves with organic fertilizer as they emerge. Cover the emerging leaves with some soil to protect them from late frost.</td>
</tr>
<tr>
<td>Summer cabbage</td>
<td>R Sow and keep in small pots for 4 weeks until the plants are big enough to be transferred at about 30cm from each other. Protect from birds and caterpillars. Also possible to grow in pots.</td>
</tr>
<tr>
<td>Tomatoes</td>
<td>D Sow in a protected area in small pots or containers. Repot when needed and transfer when weather allows. Also possible to grow in pots</td>
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</tbody>
</table>

### APRIL

<table>
<thead>
<tr>
<th>Vegetables</th>
<th>Growth method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beetroot</td>
<td>R Sow at the end of April. Trim regularly keeping the plants 10 cm apart. When the leaves are large enough they can be used in salads.</td>
</tr>
<tr>
<td>Cavolo Nero</td>
<td>R like the summer cabbage – sow in April and harvest between September and January.</td>
</tr>
<tr>
<td>Climbing French beans</td>
<td>D Sow in small pots. Re-pot it in a sunny spot when there are no more risks of late frost. Use supports at least 2.5 m high.</td>
</tr>
<tr>
<td>Beets</td>
<td>R Sow the seeds 3-4 cm apart. The trimmed part can be moved on to the flower beds.</td>
</tr>
<tr>
<td>Keep one sowing lettuce and onions as well as radishes and rocket in April.</td>
<td></td>
</tr>
</tbody>
</table>
**MAY**

<table>
<thead>
<tr>
<th>Vegetable</th>
<th>Growth Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kidney beans</td>
<td>Sow at the beginning of May in small pots and repot when they are grown (watch out for damages caused by slugs). No need for support.</td>
</tr>
<tr>
<td>Courgettes</td>
<td>Sow at the end of May in small pots, then repot in sunny spots when grown enough. Water profusely. It is possible to keep a plant on each pot or repot in the soil 60 cm apart.</td>
</tr>
<tr>
<td>Pumpkin</td>
<td>Sow in small pots at the end of May and repot in a sunny spot. Can be grown in a large pot. Water profusely. Can grow upon a trellis.</td>
</tr>
</tbody>
</table>

**JUNE**

Keep sowing lettuce. Get rid of all weeds and water regularly.

**SEPTEMBER**

<table>
<thead>
<tr>
<th>Vegetable</th>
<th>Growth method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Onions</td>
<td>Plant the bulbs 15 cm apart. Harvest when the leaves begin to turn yellow and sag.</td>
</tr>
<tr>
<td>Winter lettuce</td>
<td>It can benefit from a protective cover.</td>
</tr>
</tbody>
</table>
Keep sowing lettuce, beets.

**OCTOBER**

Harvest

**NOVEMBER**

<table>
<thead>
<tr>
<th>Vegetable</th>
<th>Growth Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broad beans</td>
<td>Flower and bear fruits between June and July. Sow in November 15-20 cm apart. Might require supports at the beginning of summer. Also possible to grow in pots.</td>
</tr>
<tr>
<td>Garlic</td>
<td>Separate the cloves from a head of garlic and plant 15 cm apart and 8 cm deep. Harvest when the leaves turn yellow and sag.</td>
</tr>
</tbody>
</table>

**Notes**

It is also possible to grow white or red winter cabbage, savoy cabbage, cauliflower, broccoli, celeriac, kohlrabi, leeks and turnips, but these require a lot of space and have a longer growing time.

Sweet corn needs to be sown in groups of at least 10 plants in order to be pollinated. Basel and coriander (annuals), thyme, rosemary, sage and marjoram (perennials) can be grown from seeds.
LET’S HAVE A VEGETABLE GARDEN AT SCHOOL

Schools with a small organic vegetable garden in their courtyard are definitely one of the most interesting developments in the schools of Italy. Tending to a vegetable garden makes us use our manual skills, scientific knowledge, and also develops our interdependent thinking. It is a great educational tool which helps reconnect the students with the roots of food and life. Through the various activities of sowing, caring and composting, the students can learn the principles of environmental and food education, in a context which favours their physical and psychological welfare, where they can learn to look after their own territory and think about their local and family histories.

Most Italian students would have a family member connected with farming! The school garden represents a tangible connection between theory and practice, where the knowledge of the various products together with the consideration for the right times and products for sowing, become real actions such as getting the soil ready, composting, watering, check for parasites, and eventually harvest and eat the fruits of the earth. Moreover the work can become a real ‘treasure hunt’, looking for native and ancient seeds with the help of the elderly. Also it is possible to produce humus with the recycling of compost.

SEEDS, A HANDFUL OF NATURE

In the southern countries of the world, where the feeding of the family mostly depends on foraging and growing vegetables, women and children are the guardians of biodiversity.

They have in fact the task to select and store the seeds, and exchange with family and neighbours. Also in our countryside in the past, seeds were recognised and used for their games by the children. To do a research on the diversity of seeds can open up different work opportunities: an historical research on Italian traditions of the past; a study on other peoples’ customs; a visit to agriculture farms near the school which have stored and still use their own seeds or those recovered by other ‘guardian farmers’ (www.ortidipace.org); the creation of a ‘guardian-keeper’ which would host, when possible starting with the seeds, many varieties of local plants.
MILK
Short supply chain
Milk is wholesome nourishment with a high nutritional value: if drunk in the recommended quantities it contains nearly all nutritional elements indispensable to the human body. The composition of milk – water, proteins, sugar, vitamins and minerals – can vary depending on the species of mammals, but also on various elements around the animals producing it (genetic characteristics, lactation period, feeding, breeding conditions etc.).

The dairy supply chain is the journey that milk and its derivate make to land on the consumer’ table. The several types of milk and dairy products in the market are normally produced in factories or food businesses, which must follow strict hygienic rules for both production and distribution in order to guarantee the food safety of the products they introduce to the market.

The production businesses of milk and dairy supply chain can be summarised as:

- Collection centres: the factory where raw milk is collected and eventually cooled down and filtered;
- Pasteurisation factory, where milk is pasteurised;
- Standardisation centre, where raw milk is skimmed or the natural milk constituents are modified;
- Processing plant, where milk and dairy products are processed, modified and packaged.

Generally speaking all workers in the food business must guarantee that the production, processing and distribution phases meet the hygiene requirements laid down by the health regulations in force throughout the European Community and in the national territory.
THE MILK WE BUY

In order to solve the problem of deterioration (freshly milked milk already contains a natural microbial flora, partly useful and partly harmful), the milk we consume is pasteurised: it is heated up to a temperature of 74 °C for 14 seconds to destroy the dangerous bacteria and maintain the protein component, very important in nutrition but extremely sensitive to high temperatures. After this step the milk can be stored in the fridge for up to 4 days after the processing.

But is this always the case? In Italy we can buy long-life milk which is delivered after a journey of many kilometres and after having undergone several processing steps, which will extend its shelf life, but might deteriorate the quality of the product. It might happen that milk is produced in Poland and pasteurised there, then transported to Germany to be homogenised, where the fat components (that break down more easily) are heated up to very high temperatures and then poured back into the milk.

The milk is then pasteurised again and filtered through porcelain filters (which capture impurities but also some nutrients), and eventually shipped to Italy for packaging and sale. A long journey and a series of steps that make it hard to really understand the product we consume.

MILK ON DRAFT

Contrary to the fresh milk we can buy already packaged and sealed, in shops and supermarkets now we can also buy from vending machines raw milk which hasn’t had any heat treatments. It comes from local farms, carefully controlled in terms of health and hygiene by the competent local health authority. Milk is filtered, cooled down to a temperature between 0°C and 4°C, and stored at this temperature.

Milk vending machines, also controlled by the health authority, are directly managed by producers. This way shortens the distance between the area of origin and the retail chain, decreasing costs of transports and pollution. In addition with milk on draft we see a reduction of packaging, as this method encourages instead the use of glass bottles. The milk that does not get sold by machines after 24 hours goes into the cheese production process to be transformed in ricotta and other cheeses.
**ZERO MILES FOOD**

In Italy, the sale of raw milk from producer to consumer is allowed only if respecting the specific requirements of hygiene, structure and function, involving breeding, personnel, premises and equipment storage, transportation and sale of milk. This way of direct sales reconnects citizens and farmers, and allows us to rediscover the tastes and flavours of local products.

The short chain was created to enhance the quality of local farming, reducing the cost of intermediation, as well as encouraging and promoting the consumption of local products. The milk is only one of many products that can be purchased directly from the manufacturer, but there are also fruits, vegetables, cheeses, preserves, wine, oil etc.

The aims of this alternative form of trade are:

- A fair income for the producer;
- A greater assurance of food quality and safety;
- Encouraging the use of local products and avoid costs of transport;
- Limiting pollution by limiting transport and waste (packaging).

**HEALTH WILL BENEFIT TOO**

The short chain, unlike the large-scale retailers, has also the advantage of traceability, i.e. we can trace and follow the journey of a product.

In addition it encourages better eating: through direct sales you can only buy seasonal products, fresh and genuine, unlike the big supermarkets, where everything is available throughout the year. Respecting the natural cycles guarantees the quality of the product that maintains flavour as well as nutritional value, because it is not subjected to processing or pesticides in order to be transported for a long time and sold 12 months a year.
THE PERFECT SHOPPING

Arrange a visit to the supermarket and compare the products in the various departments, focusing especially on fresh products: fruits, vegetables, milk and cheeses, bread, eggs etc. Write down the provenance of each product and list them from the nearest to the farthest. What is the average distance? Does it change depending on the products characteristics? Try and create the “perfect shopping”, which pleases everyone’s taste and satisfies nutritional needs, but also contains the products that have travelled less.

UNPACKAGED PRODUCTS

Check if the supermarkets sell unpackaged products such as flour, pulses, rice, etc. Compare prices per kilo between these products and those in packets; finally think about what the best way would be to bring home the unpackaged products using the least amount of packaging.

LOCAL MARKETS

Check whether in your neighbourhood or near the school there are any local markets where local producers sell their goods. You can arrange a series of interviews and listen to their opinions, their problems, and their proposals. You can also promote these markets through “advertising” for your families.

AT SCHOOL

Check if the school canteen uses and offers local products, and in what percentage. If there are none, suggest that they get introduced.
Too much waste!
THE RUBBISH BIN

TOO MUCH WASTE!

On average every Italian throws in the bin 528 kg every year, which makes the
national total nearly 30 million tons.
The composition of this huge mass of materials is very variable depending on the
type of town planning, geographical area, and the seasons. Mostly these are food
scraps, that is organic substances produced in lands hundreds of kilometres away
(sometimes even thousands), which will never return to the places of provenance
thereby interrupting a fundamental biological cycle. In place of this enormous
organic mass thrown away as waste, every year the Italian farmland gets sprayed
more than 23 and a half million tons of chemical fertilizers, about 160 quintals per
hectare.
Another part of the material is made from discarded tissues, domestic utensils,
furnishings and appliances.

Sometimes we get rid of these things when they are too worn out, but more often
because we don’t like them anymore or are out of fashion. In some cases home
appliances are thrown away because no one wants to fix them, whether there are
no spare parts or because they are designed as such to make it complicated and
therefore too costly, to repair. This enormous mass of material is called ‘municipal
solid waste’.
To these we must add around 75 million tons of material discarded by factories
after being used for a very short time: for example disposable packaging made
of various materials (plastic, aluminium, cardboard, polylamimates, glass, etc.). In
addition there are another 50 million tonnes of hazardous waste, such as medical
waste, sewage disposal materials, demolition scraps etc.

WHERE DO THEY END UP?

Our lifestyle is defined by a constant purchase of goods and by an equally instant
production of waste, so much that for some years the ‘waste crisis’ has become a
constant topic of newspapers and TV news.

But what happens to all this waste? The most common solution so far has been,
and most likely will be, also the easiest: dispose of the waste by accumulating it in
landfills and, in smaller amounts, by destroying by incineration.
However the issue of the build-up of waste cannot be solved only with its disposal,
because any method, even the most advanced, has negative effects on the
environment and on the natural resources that are necessary for our survival. For
example, a landfill produces sewage that can damage the health of the soil and
aquifers, and gas that can disperse into the atmosphere; the incinerator, despite
allowing the recovery of some of the energy which is released during combustion,
produces fumes releasing small particles of toxic substances into the air that we
breathe. In both cases, another source of pollution is released by the exhaust fumes
of the lorries that transport the waste to disposal plants.
SOLUTIONS

Although we are becoming more attentive with the recycling, which means that an increasing amount of paper, glass, plastic, cans and food waste is recycled to produce new materials and products, it is also true that we are producing more and more waste. A way forward, therefore, it is to try to reduce waste at source by producing less, for example by avoiding buying products with excessive packaging.

Every Italian produces about 530 kg of waste in a year, of which 200 kg are made by packaging of different types and material.

Here are two examples. Eggs: we buy 6 from the shop in their cardboard or plastic box. At home, however, the eggs go in the egg tray in the fridge (all fridge doors have one), and the box goes straight in the bin.

The fruit: at the supermarket we buy apples, some pears and bananas; we have to weight them separately in plastic bags, even though at home we will arrange the fruit in a bowl all together, and the bags end up in the bin straight away. But how do you take some eggs home without the box? It’s almost impossible, and we may end up with an omelette! So that is certainly some very useful packaging. On the other hand, apples, pears and bananas can be taken home in the same bag or, even better, in a reusable bag.

FOOD WASTE

30-40% of the total of our waste consists of food waste. This is why it’s important to be more aware of the issue: to reduce these amounts is a task for each and every one of us. Each year, a consumer from the western world throws away up to 1/3 of what he buy. This sadly means that with the food waste of every single person we could drastically reduce, if not eliminate, the problem of world hunger.

Food waste is also an increasing problem for the environment: indeed water, CO₂ and other resources are unnecessarily exploited for food that no one eats. An unnecessary waste, but also harmful CO₂ absorbed by the atmosphere.

LESS PLASTIC!

A significant part of all the waste ending up in our bins every day is composed by plastic objects, used to contain or carry food. Recycling doesn’t solve the problem, because it’s important to reduce the amount of waste produced in order to reduce the amount of materials that are costly for the environment, both during production and disposal.

It is not difficult to reduce the kilos of plastic per person, we only need to get more organised. Some simple steps such as drinking tap water, buying products in bulk or unpackaged, reducing disposable items; these are all actions that can save money, have less waste to dispose of, and show a real commitment to protect the environment.
In January 2012 WWF Italy launched the project One Planet Food aimed to promote food habits with low environmental impact and improve the relationship between food and the Planet.

According to WWF, food is sustainable if it respects biodiversity and ecosystems, if it is adequate from a nutritional point of view, if it utilises smartly natural resources, and if it respects people communities with a principle of equity.

Its many benefits are linked to the composition of its typical foods, mainly of vegetable origin (fruit, vegetables, legumes and cereals), and to their diversified and balance consumption.

Sustainable eating doesn’t create long-term negative effects on our health, on the environment, society and economy.

It’s a multifaceted challenge that requires an integrated approach between scientists, citizens, businesses, politicians, consumer organisations and other NGOs. One Planet Food program works with all of them to achieve a changeover to a more sustainable food system that can contribute to the preservation of biodiversity and to ecosystem services conservation, to an efficient use of natural resources, reducing pollution, to the fight against climate change, and to achieve greater equity in the global management of food.
NOURISH THE GOOD HABITS.
10 SIMPLE RULES TO EAT SUSTAINABLY

1. BUY LOCAL PRODUCTS
   Eat fresh products, buy local products to support your local economy, and reduce CO₂ emissions by lessening the transportation of food.

2. EAT SEASONAL PRODUCTS
   Fruits and vegetables are seasonal, follow the seasons and cut the costs for yourself as well as for the Planet.

3. LIMIT YOUR MEAT CONSUMPTION
   Limit the number and size of meat portions you eat every week, only eat meat produced with traditional and organic methods, and try to alternate with vegetarian protein sources (such as pulses).

4. CHOOSE THE RIGHT FISH
   Give priority to local species, buy in legally standard sizes, and try to choose from a greater variety of species.

5. REDUCE WASTAGE:
   IF YOU HAVE BOUGHT IT, EAT IT
   Nearly 1/3 of the food we buy ends up in the bin. In addition to wasting money, this also has a high impact on the environment.
6. CHOOSE ORGANIC PRODUCTS
Organic farming is based on respecting all the natural ecological processes, as well as the natural resources (soil and water above all) and biodiversity, by eliminating all chemical and synthetic substances.

7. AVOID HEAVILY PACKAGED PRODUCTS
We can choose to buy products with less packaging. Packaging will otherwise become wastage, which contributes to high costs for disposal as well as for the environment.

8. AVOID HIGHLY PROCESSED FOOD
This requires a lot of resources to be produced and stored, and has a high impact on the environment. Processed food also contains elevated quantities of salt, sugar and fat.

9. DRINK WATER FROM THE TAP
The best water doesn’t necessarily come from a bottle. If we protect our rivers, lakes and aquifers, we can have good quality drinking water directly from our taps at home.

10. AVOID WASTAGE IN THE KITCHEN
In addition to eating your leftovers, if you use your stove correctly you can avoid ‘burning’ extra resources!
ALL CONTENT RESPONSIBILITY IS OF THE BENEFICIARY OF THIS PROJECT, AND DOES NOT REPRESENT THE OFFICIAL POSITION OF THE MINISTRY OF AGRICULTURE, FOOD AND FORESTRY.