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GeoProgress Journal

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Editorial Note

"Feeding the Planet" is at one with the issue of environmental protection, the one of adapting social environment and agriculture to climate change and to its effect to other natural conditions related to food production. The concept implies the need of an increasing production and consumption of energy that, to avoid a negative drawbacks, must be generated in more sustainable ways. In vast and important agricultural regions, firms can produce, with sub-products and other renewable sources, most of the energy they need. The portion of energy obtained from not renewable sources, which seems necessary at least in the medium term, must be balanced by the reduction of energy consumption from other uses.

The articles published in this number and the ones of the previous one had been proposed during the conference on "Food, geography and security policies", held in Turin on 3-4 May 2016, within the context of the 1st Geoprogress Global Forum (see www.geoprogress.eu/events). Many of them deal with food production and natural environment interactions and others essentially to natural environment conditions. These papers consist in a link between the core issue of the Global Forum, whether and how is possible to produce and distribute a quantity of healthy food sufficient to meet current and future needs of human beings, and the wider issue of energy. On the latter, at the end of the conference, it had been decided to extend the discussion because since the global environmental issue largely depends on energy.

Whether and how is it possible to produce, distribute and consume energy in a sustainable way, in order to satisfy the future needs of humanity, including those of the current billion of people that have still no access to electric light, will be the core issue of the next International Conference that Geoprogress Journal is willing to organize on 7-8 September 2017 in Bruxelles. This location has been chosen to foster the direct participation of researchers, operators, public decision makers of many countries and international organs, due to its geographical position.

The sessions of the conference will be addressed to the needs and the modalities of providing energy for the production, the distribution and the consumption of food, for industries and transportation; and, especially to the necessities of energy of poor countries and their villages, that should be satisfied in the most sustainable way, under every aspect.

Emer. Prof. Francesco Adamo, Editor in Chief

CULTURAL IDENTITY, TERRITORY AND AGRI-FOOD SUPPLY CHAINS. THE CASE OF SOME PRODUCTS OF THE MEDITERRANEAN DIET

Giovanna Galeota Lanza*

Abstract

Recognized "Intangible Cultural Heritage of Humanity" by UNESCO in 2010, the Mediterranean diet can not be reduced to a mere set of typical foods of the Mediterranean basin, it coincides with a common modus vivendi to the countries bordering on the same sea. An element of pure cultural identity that has become a healthy and sustainable diet model, indeed, one of the most sustainable food models both for the environment that for health.

Yet, even if we are talking about a real lifestyle, it's mostly food and raw materials (vegetables, fruits, cereals, olive oil) that, as such, can not escape the logic of the globalized market.

Through an analysis of the agricultural and food production and import-export flows, this paper proposes, in relation to the Italian case, to examine to what extent some products that traditionally compose the Mediterranean diet come from that region and, conversely, what is the share of those imported from other countries.

1. Food, Identity and Territory

Dietary practices are a major construction areas of identity, within which food serves as a powerful case of meanings, a vehicle for individual and community representations, both self-directed that heterodirect (Neresini and Rettore 2008). The messages transmitted by a food culture can be of various nature but, in any case, always communicate identity values. May be included, in fact, the economic identity, which manifests itself, for example, through the use of precious and refined foods as a sign of wealth; or social identity, since, especially in the past, the quantity and quality of food were in close relationship with the belonging to a specific class. The food, in fact, was the first way to show off the class differences. Even religion links its identity to foods, for example, the bread and wine of the Christians go far beyond the material dimension; the diet of the monks has its own rules, as well as Lent which includes abstinence from certain foods. Moreover, in many religious contexts, some exclusions or food taboos (pork and wine of Islam, the complex series of licit and illicit foods of Judaism) have the prevailing role of a belonging report. Through foods can be expressed, also, philosophical identity, such as vegetarian diets linked to the respect of living nature (Barillaro, 2005).

Finally, the Alimentary Culture in the broadest sense may coincide with the ethnic identity of an entire nation. It is not uncommon to associate a particular type of food to a particular nationality or population: for example Italians are associated to the pasta; Chinese to the rice and German to the beer (Montanari, 2000). This happens because each culture has adopted and codified specific food rules that prefer some foods over others, codes based on different factors, such as the environment, the history and the geographical position. In this perspective, food then becomes not only necessary for survival, but also a true cultural necessity (Spagna, 2015).

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On the basis of the above, it is clear that between food and nutrition you establish a strong relationship rooted on a symbolic level. This relationship is linked to personal and social identity stabilization processes. Food, together with the practices of preparation, cooking and presentation accompanying the consumption, helps to anchor the individual in his social space and also creating an intimate connection with the territory in which he lives.

This happens because of cultural elements related to the individual's position in the social stratification and in connection with his accession to a lifestyle and to an ideal model. "You are what you eat", it has been said (Caplan, 1997) and between eating and being there is an intense, reciprocal, dynamic and indissoluble relationship. After all, the taste-setting process is a process of identity construction: not only we are what we eat, but we eat what we are, we nourish ourselves of our history, and our symbols.

In the current stage, the relationship does not appear to be driven by increasingly converging forces. Over time they have established consumption patterns placed on global movements that move in a transversal way on a planetary scale. It is mass foods, or regarded as such, without a clear territorial anchor (the typical global food), or of dishes that have, at least symbolically, local roots even if characterized by a planetary diffusion: the pizza, sushi or the Chinese food. Nevertheless, these forces overpowering and depersonalizing, that have characterized to a large extent the stage of late modernity, are processes of re-anchoring the territory (Dematteis, 2001) that recognize food as a cultural heritage to be safeguarded. This is as true in small communities, as in the macro-regional reality characterized by the same lifestyles and, therefore, by the same nutritional patterns.

A signal in that direction, came following the UNESCO Convention on Intangible Heritage of Humanity (signed in 2003 and operational since 2005), in which were included in 2010 the Mediterranean Diet (MD), the French and Mexican cuisine (Italian UNESCO Commission, 2010). In these cases, food cultures have been assessed as testimonies of traditional practices and useful knowledge for the life of all mankind.

The recognition of the MD was linked to the very meaning of the original word in the ancient Greek language *diaita*, namely lifestyle. A real modus vivendi based on socio-cultural and environmental values shared by all nations bordering the same sea. It is a series of foods that are consumed mainly through forms of sociability and rituality that reinforce social cohesion and are a traditional knowledge respectful of natural resources and biodiversity, an example of sustainable development of links between material and immaterial culture.

The MD was considered, in fact, as a "set of skills, knowledge, practices and traditions ranging from the landscape to the table, which include the cultivation, harvesting, fishing, conservation, processing, preparation and, particularly, the consumption of food. It is characterized by a nutritional model remained constant over time and space, whose main ingredients are olive oil, grains, fruits and vegetables, a moderate amount of fish, dairy products and meat, many seasonings and spices, all accompanied by wine or infusions, always respecting beliefs of each community "(Italian UNESCO Commission, 2010). It is, therefore, not only a nutritional scheme, but also a genuine form of social interaction promotion, carried out through customs and celebrations, which succeeded in giving birth to "a formidable body of knowledge, songs, proverbs, stories and legends "(Italian UNESCO Commission, 2010). These elements constitute the added value that motivated the choice of UNESCO, which sees the protection of diet combined with respect for the territory, ensuring the preservation and development of traditional activities and crafts linked to fishing and farming in the Mediterranean community (Colella, 2013).

Put at the table for centuries, the MD is therefore the result of the constant sharing of traditions, innovations and creativity and, even today, it remains in the eating habits of most of the basin populations. Yet, even if we are talking about a real lifestyle, it's mostly food and raw materials (vegetables, fruits, cereals, olive oil) that, as such, can not escape the logic of the globalized market.

The food internationalization process has, in fact, resulted in the maximization of the exploitation of natural sources of food and increased food trade for each country. Have gradually been created, thus, more and more long chains of production, procurement, processing, packaging and distribution of food.

The pressure of the agro-industrial lobby and shopping to conquest of markets, resulted in the increase of food exports (subsidized) by the North of the world and generated dumping against several small farmers and retailers, especially in developing countries, who were unable to withstand the competition of produced from foreign commerce. Although foods are not necessarily produced to be exported beyond the borders of each country, global markets today impose the rules of the game, and food commodities have become a means of financial investment on a par with any other commodity handled on the stock market (Parascandolo, 2013).

The European countries bordering the Mediterranean, and among these, in particular, Italy and France, can be considered as the cradle of the typical MD food products. However, even in such countries, although characterized by a high per capita income, local agricultural production, especially those to small-scale, must compete with the constant use by the processing industries to globalized production circuits.

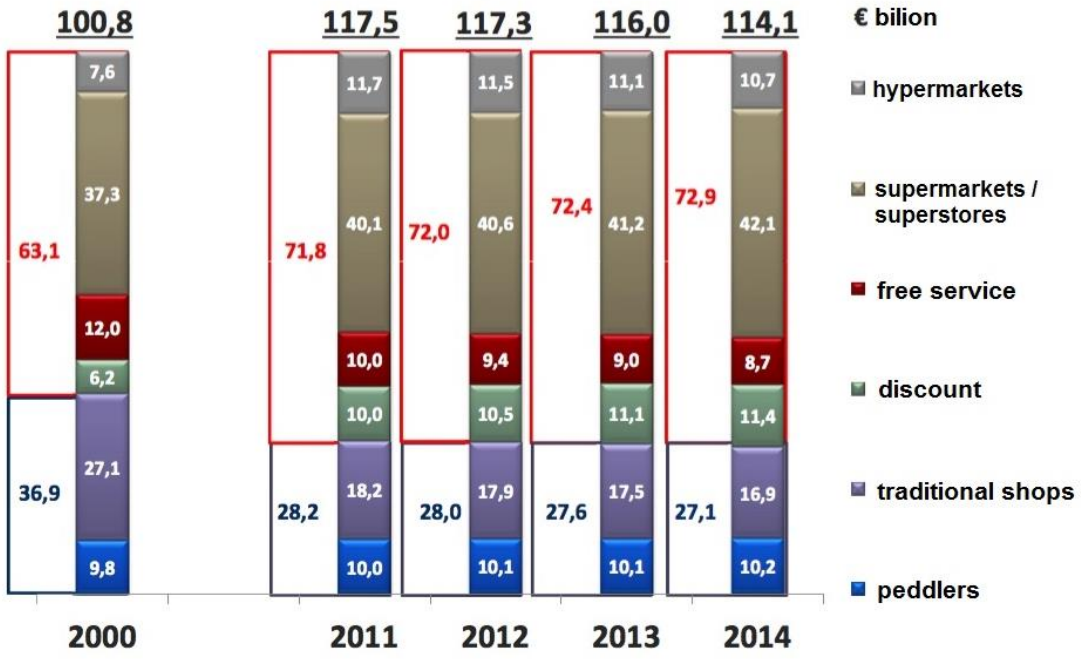


Figure 1: Evolution of the share of food distribution channels in Italy (%)
Source: AC Nielsen, 2015

This allows, to such industries, a considerable reduction in production costs in order to meet the increasing demands from, above all, the Great Organized Distribution (GDO). This sector is controlled, particularly in Italy, almost entirely by foreign multinationals, whose interest is to offer the most competitive prices on the market regardless of the geographical origin of the products. Moreover, always related to the Italian situation GDO is a growing steadily channel.

Since 2000, the weight of the GDO has always been greater than that of so-called traditional channels (Peddler and retail shops). This weight also increased over time, from 63.1% in 2000 to 72.9% in 2014, by contrast, has declined in other channels that passed from 36.9% to 27.1% (see Fig . 1).

In literature, there are several studies about the relationship between the food industry and the GDO, especially in relation to the effects that such links have in influencing the inflation process, affecting the price charged to consumers. Among them, the older, state that the size reached by the GDO can be useful to counterbalance the market power exercised by big industry (Galbraith, 1952), while other, more recent, argue that the high concentration in the distribution sector is likely to excessively broaden its market power (Lloyd et al., 2006). This would result in a decrease in the bargaining power of agricultural enterprises in the supply chains, resulting in the spreading of unfair trade practices.

About the origin of products, as will be explained later, the existing mandatory measures in Europe only consider certain types of foods, while for many others the information may be omitted, compromising their full traceability. The consumer may be, therefore, in a position to buy a product which comes under Mediterranean way of life, but that's probably not entirely Mediterranean, uprooting consciously or unconsciously from the territory of which he feels part of.

2. The flows of import and export of food production in Italy

The production and consumption of food, as repeatedly stated, are the expression of a set of relationships, often informal, which constitute the tissue of social life of a community, whose persistence allows to keep alive the traditions and cultures that would otherwise be lost. Despite this, do not always coincide with the geographical place in which they are acquired and recognized as symbols of local food culture is often the case that the country of origin of the raw material used in the production of foodstuffs, (this happens, for example, as we will deepen later, with grain and pasta).

Understood in this sense, the recognition of the MD as a cultural Heritage is a starting point to make several reflections on the dynamics of the Italian food industry. Moreover, the meaning of the term "culture" in Latin is derived from *cultus*, the past participle of *còlere*, meaning cultivate.

The agricultural sector is an important component of Italian trade with foreign countries, with a weight in terms of trade volume (exports plus imports) of approximately 9% (ISTAT, 2016). The balance of the Italian agri-food trade has been, over time, structurally and permanently negative (see Figure 2).

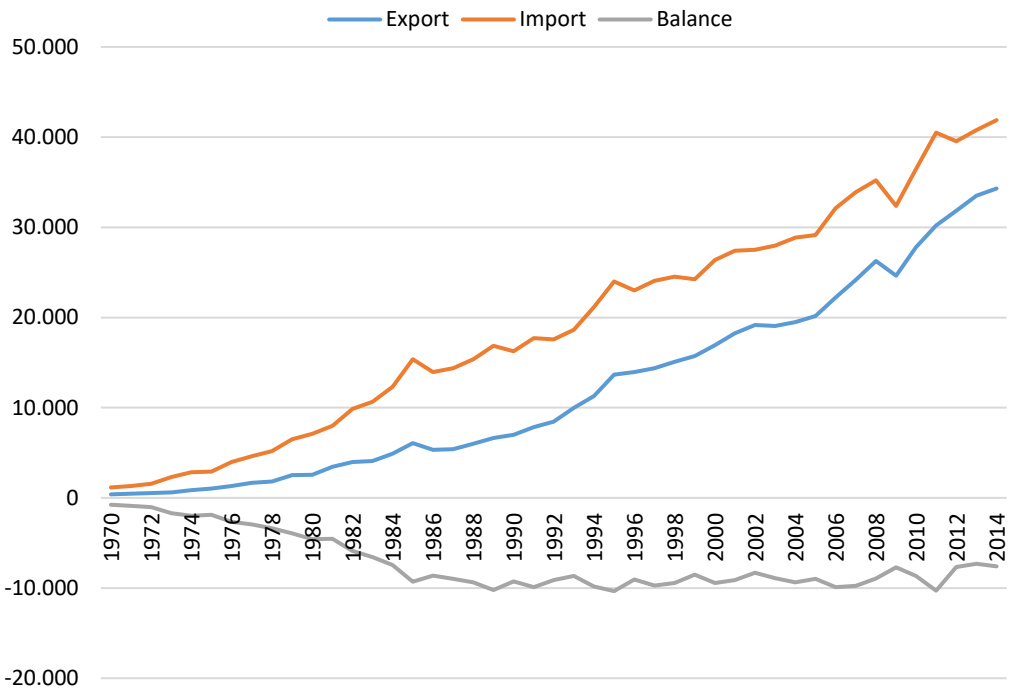


Figure 2: Thrends of agri-food trade in Italy from 1970 to 2014 (million EUR)
Source: Elaborations on ISTAT data, 2016

This has contributed significantly to the deficit of the Italian trade balance and is also a component in some ways hardly compressible, as resulting from the structure of the Italian primary sector, from the dependence on imports of certain agricultural and food consumption, as well as by the need to import raw materials for the domestic processing industry.

In this regard, it must be stressed that the Italian agro-food balance encompasses two components that differ greatly among themselves, ie the balance of the primary sector, which is very negative and rather stable over time and that of the transformed component (food industry), which tends to be much closer to break even and still constantly improving. This confirms the well-established trade specialization of the Italian food system based on the processing of agricultural products imported from abroad.

This pattern of specialization claimed over time Italy's position as an exporter of processed products (including from farms that include the process of primary processing within them) (Henke, 2008 Salvioni, 2011). This choice was dictated by the geographic and climatic conditions of the country, due to the scarcity of land, and for the specific natural conditions, has to import most raw materials.

In Italy, moreover, it is estimated that, from the Seventies to the first decade of the millennium, the utilized agricultural area has decreased by 28%, falling by about five million hectares (nearly eighteen million in 1970 to just under thirteen 2010) , ie an area equivalent to Lombardy, Liguria and Emilia Romagna together (ISTAT, 2010). The greatest decrease was mainly the area with arable crops and permanent grassland, namely

the areas from which come the main base of Mediterranean food products, including bread, pasta, vegetables, meat and milk[1].

However, the reason of substantial food imports is also the result of the industrialization and modernization of the primary sector process that, if in the past responded fairly well to its main production feature for domestic food use (Fabiani, 1986 and 1996), today for the renewed role of agriculture in economy and society (Sotte, 1997, De Benedictis and De Filippis, 1999, De Filippis and Henke, 2009, Sardone, 2012), can not support the entire domestic demand. In other words, there is a tendency towards multi-functionality of agriculture, which is no longer seen only as a supplier of raw materials for the food market of the country, but as a sector capable of reaching international markets and / or produce innovative goods such as biomass or biodiesel.

In order to better understand the structure of the Italian agro-food trade, it is useful to analyze a recent study by the Council for Research in Agriculture and Agricultural Economy Analysis (CREA, 2015) which identifies the geographic distribution of total food flows (Table . 1). The analysis examines some groups of countries identified by their geographical proximity and membership in free trade areas or to the presence of trade agreements of various kinds. Therefore, beside the aggregations of countries by geographical continents, are WTO members, members of other free trade areas (the European Economic Association - EAA, MERCOSUR) and countries that have trade agreements with the EU (EUROMED).

Regions	**Import**	**Export**	**Balance**
World	41.991	37.208	-4.782
Wto	41.460	36.013	-5.447
Ue 28	28.889	24.464	-4.425
Other European countries (No Med.)	1.286	2.339	1.053
Third Countries Med. Europeans	127	216	89
Third Countries Med. Asian	730	564	-166
Third Countries Med. Africans	789	692	-97
North America	1.702	2.673	24.020
Central America	533	161	-372
South America	2.970	333	-2.636
Mercosur	2.074	220	-1.853
Asia (Excl. Med.)	3.335	3.029	-306
Asean	2.080	425	-1.655
Africa (Excl. Med)	1.189	434	-755
Oceania	441	520	79

Table 1: Italy's total agri-food trade by geographical area, 2015 (millions of current euro)
Source: Report on Foreign Trade of food products 2015. CREA, 2016

The destinations of the Italian agro-food trade are highly concentrated and, above all, strongly influenced by membership of the European Union, since the existence of a

[1] Even though up to now, the loss of agricultural area have not resulted in a proportional loss of agricultural production (and therefore lack of food availability), thanks to the introduction of new techniques that have allowed to increase the productivity per hectare and intensify livestock activities, currently, the increase of the inputs on the lands is no longer able to increase the production. This led, therefore, to the point where the application of larger amounts of available technologies no longer corresponds to an increase the performance of cultivated land.

common commercial and agricultural policy has dictated, often and for a long time, a number of constraints and conditions. To these must be added also the seasonality and perishability of agricultural and food products, which often influence its timing and method of transport, especially over long distances.

As was to be expected, Table 1 shows that, in 2015, the most important trade partner, both with regard to exports and to import, is the EU's area 28. The second area is represented by Asian countries (non-Mediterranean) with which there is the highest negative balance compared to all other geographical identified areas.

With regard to exports among the top twenty countries recipients of Italian products, are placed in 2015 fourteen EU partners, including four of Eastern Europe (Poland, Czech Republic, Slovenia and Romania). It should be emphasized, however, that the number of outlet markets for Italian exports remains quite wide, with important partners in different continents, such as USA, Canada, Australia, Japan, China and Russia. Given the dynamics of import and export (see Fig. 2), the normalized balance between geographical areas configures Italy, on the whole, as a net importer of food products (Fig. 3).

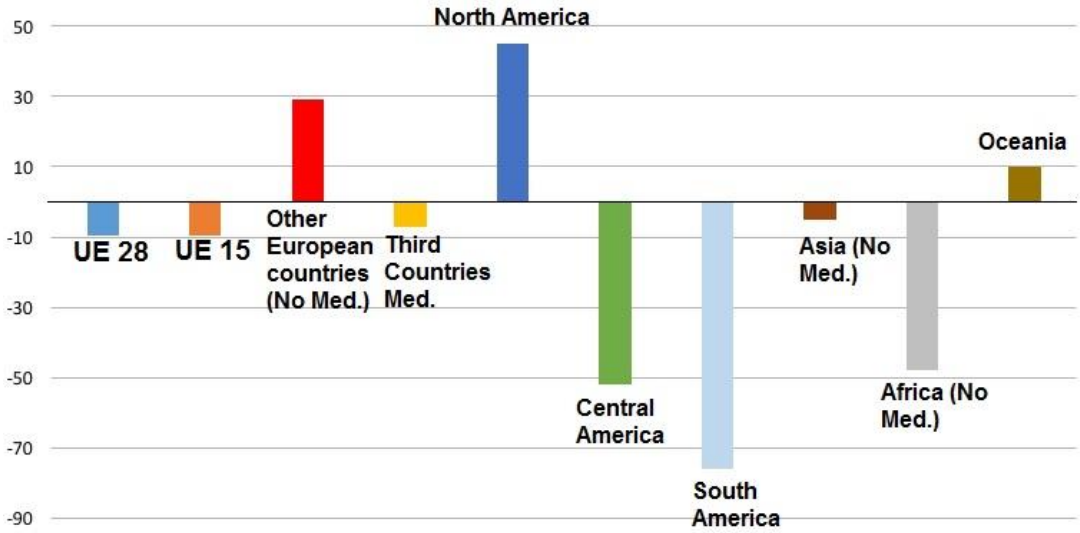


Figure 3: Balance of agribusiness normalized by region, 2015 (%)
Source: Report on Foreign Trade of food products 2015. CREA, 2016

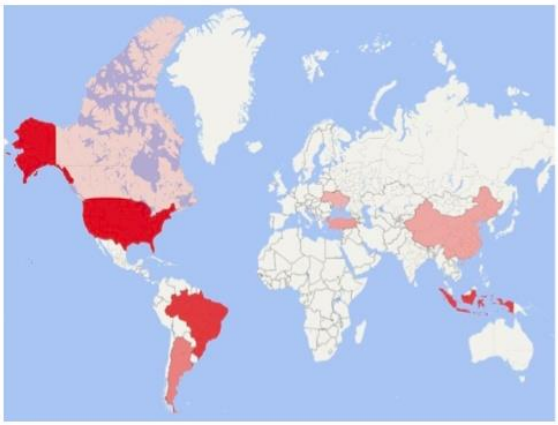
There are, however, important distinctions between the different areas analyzed. In fact, if on the one hand, Italy has a considerable trade deficit especially with Central and South America (-53.5% and -79.8%), with the non-Mediterranean Africa (-46.5%) and, to a lesser extent, with the EU (-9.5%), on the other hand, the balance is firmly positive with North America (+ 44%), other non-Mediterranean European countries (+ 29%) and Oceania (+ 8.3%) (see Figure 3).

Under the specific issue of imports, it is possible to achieve similar considerations to those already made for exports. In fact, Italy's main supplier is the European Union (68.8%), which is followed by Asia (non-Mediterranean) with a 7.9% and South America with 7.1% (CREA , 2016). From these observations it is not surprising that among the first twenty supplier countries of Italy there are twelve EU countries, including France and Germany which remain firmly in the first two positions (Fig. 4).

Countries	Absolute Value
France	5571.1
Germany	5279.2
Netherlands	4736.3
Austria	3212.1
Belgium	1189.2
Poland	1136.6
Greece	1076.1
Denmark	804.2
Hungary	769.9
United Kingdom	741.6
Ireland	555.1

Figure 4: Structure of the Italian agri-food imports. The main suppliers in the EU(2015)
Note: Million euro. Source: Based on FAO data, 2016
Source: Based on FAO data, 2016

Conversely, again in 2015, the first suppliers outside the European Union borders are the United States, on the second and third place, however, there are Brazil and Indonesia. Follow, then, Argentina, Turkey, China, Ukraine and, finally, Canada (see Fig. 5).



Countries	Absolute Value
United States	1114.4
Brazil	1023
Indonesia	1004
Argentina	762
Turkey	658
China	625.1
Ukraine	592
Canada	587

Figure 5: The principal non-EU suppliers (2015)
Note: Million euro. Source: Based on FAO data, 2016
Source: Based on FAO data, 2016

In relation to the product categories of imported food, the presence of primary products or to a lower degree of transformation is far larger. This proves the structural dependence on foreign suppliers in terms of raw materials for processing, not only in the case of goods not produced locally for geographical and/or climatic reasons, such as the raw coffee, but also to cereals, live animals, carcasses and fresh fish.

With regard to the geographical areas which are major suppliers of Italy, at the forefront of foodstuffs imported from EU countries there is a typical Mediterranean product, olive oil, of which 85.8% of the total imported comes from such area. From the European Union are also imported products for which Italy is structurally in deficit shortage of available land, such as those related to livestock or seafood chain (see Tab. 2).

Goods	Million euro	Good share %	Country share %
Olive Oil and Extra Virgin	1302	4,5	85,8
Washed fish	1234,9	4,3	62,5
Pork semi-finished products, fresh or chilled	1118,4	3,9	100
Semi-finished beef, fresh or chilled	896,5	3,1	99,3
Breeding cattle	775,2	2,7	100
Manufactured confectionery or cocoa	747,2	2,6	91,5

Table 2: Main imported food products from the EU 28, 2015

Note: Good share: share of the product on all the Italian agri-food imports in the analyzed. Country share: share of area analyzed on the whole of Italian imports of the product in question

Source: Foreign Trade of food products 2015. CREA, 2016

From non mediterranean Asia come mainly palm oil (the total amount imported) and the raw coffee, as well as other fish products (cfr. Table 3).

Goods	Million euro	Good share %	Country share %
Palm oil	738,4	22,1	99,9
Raw coffee	448,7	13,5	32,2
Frozen crustaceans and molluscs	355,1	10,6	26
seed oil and vegetable fats	321,7	9,6	36,9
Washed fish	176,5	5,3	8,9

Table 3: Major food imported from Asia (Non-med), 2015

Note: Good share: share of the product on all the Italian agri-food imports in the analyzed. Country share: share of area analyzed on the whole of Italian imports of the product in question

Source: Report on Foreign Trade of food products 2015. CREA, 2016

Of particular note are the purchases of durum wheat, which comes to 68.6% of total imports from North America (see Tab. 4). The specific case of durum wheat is important because it is a product of the chain of the pasta of which Italy needs supplies from abroad, despite the non-marginal internal production and although it represents the raw material at the base of the MD.

Goods	Million euro	Good share %	Country share %
Durum wheat	578,5	34	68,6
Almonds	172,5	10,1	55,6
Soybeans	111,2	6,5	28,7
Flour and feed	111,0	6,5	6,9
Walnuts	51,8	3	34,7
Dried beans	48,4	2,8	36,4

Table 4: Main food imported from North America, 2015

Note: Good share: share of the product on all the Italian agri-food imports in the analyzed. Country share: share of area analyzed on the whole of Italian imports of the product in question

Source: Report on Foreign Trade of food products 2015. CREA, 2016

From the framework outlined emerges, therefore, not only a structural dependence of the Italian agri-food sector but, also, the presence of food imported from non-Mediterranean countries, although these fall fully in typical MD foods: indeed, as in the

case of durum wheat, even characterize it. This suggests, therefore, that although the UNESCO recognition tent also, as already pointed out, to ensure the preservation and the development of traditional activities relating to fishing and farming in the Mediterranean communities, often global dynamics push in exactly the opposite direction.

3. An analysis of Italian imports of durum wheat and processed tomatoes

Symbol of Italian style and recognized around the world as such, pasta with tomato sauce is, in Italy, the symbol par excellence of the MD. Yet, considering the above, it can be assumed that not always the durum wheat used in pasta production is of Italian origin, or at least Mediterranean.

In order to understand from where, and to what extent arrive the raw materials and food products commonly used for the preparation of the plate that identifies the MD in Italy, the two categories of foods that compose the pasta with tomato sauce and, therefore, the aforementioned durum wheat for pasta and processed tomatoes for the sauce, will be analyzed below.

Durum wheat is a minor cereal and accounts for only 5% of the total wheat. Unlike common wheat, which is cultivated everywhere in the world with the exception of tropical areas, durum wheat is grown mainly in three areas: the Mediterranean, the "Northern Plains" between the United States and Canada (North Dakota and Montana in United States, Saskatchewan and Alberta in Canada), as well as in the desert areas of the South East of the United States (California and Arizona) and northern Mexico (Baja California and Sonora).

In addition, other regions are relevant for the production of durum wheat though of minor importance: Australia, Russia, Germany, Kazakhstan, Argentina, India and Ukraine.

In the Mediterranean region, total wheat production is very variable and, because crop requires a lot of rain, this influences crop yields, especially in North Africa, where the problem of drought is stronger. Therefore, the total production may vary from 14 million tons, as for the 2014/15, to 18 in 2015/16, to a maximum of 20, as it happened sometimes in the past (International Grain Council, 2016).

The demand of durum wheat in the Mediterranean countries is, however, much higher than local productions, and then are imported more than 5 million tons every year. Among the countries in this area, Italy is the largest producer of durum wheat, with an annual average of about 4 million tons, and at the same time, it is the world's largest importer of durum and common wheat (Tab . 5). This can be explained, above all, since this is the only type of grain used in the production of pasta, of which the country is the world's largest producer. Italy, therefore, needs to import large quantities to meet the needs of the milling and Pasta Industry, that has to meet a large domestic demand and an equally strong foreign demand. Italy is in fact the first exporter of pasta (including cooked or stuffed) in the world. Only in year 2015, it has exported more than 2 million tons, four times more than the world's second largest exporter, China, which in the same year has exported about 500 thousand tons (Conagricoltura Studies Center, 2016).

EXPORT	*Value ($)*	*Volume (t)*	**IMPORT**	*Value ($)*	*Volume (t)*

Canada	6.206,41	23.552,92	Italia	2.031,39	7.148,35
USA	5.577,50	21.047,68	Giappone	1.652,45	5.530,69
Australia	4.371,50	17.053,21	Brasile	1.216	5.170,44
France	4.264,78	19.817,25	Spagna	1.201,72	5.486,60
Russia	3.948,72	21.234,23	Olanda	1.158,09	5.928,12
Germany	2.415,77	10.767,72	Tailandia	1.132,39	4.556,09
Kazakhstan	1.244,42	3.133,83	Turchia	1.103,42	4.349,82
Argentina	1.034,63	4.318,21	Messico	1.027,98	4.182,85
Poland	852,70	3.932,01	Germania	984,17	4.474,70
Romania	769,34	3.555,28	Filippine	982,11	3.384,64

*Table 5: World trade of wheat *. The top ten exporting countries, and the top ten importers, 2015*

Note: Durum wheat and common wheat, including flour

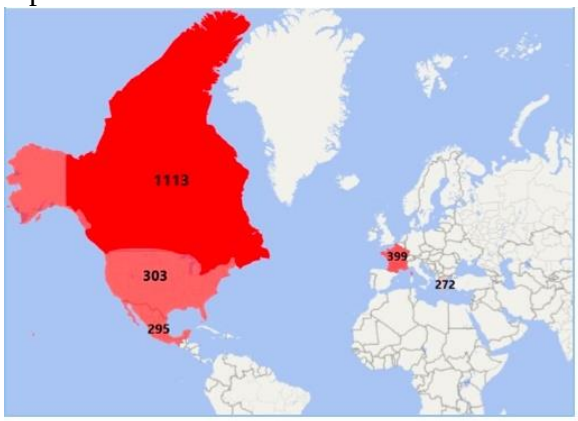
Source: Elaboration on data UN Comtrade Database, 2015

The world's major wheat exporters are Canada and the United States (Tab. 5) which are also the main suppliers of the Mediterranean countries.

In particular, Canada is the largest producer of wheat in the world, its annual production is between 4 and 6 million tons, of which over 80% is produced in Saskatchewan. This country is also the one that exports about half of the total quantities needed in Italy in 2015 (see Fig. 6).

The only two Mediterranean countries from which comes the durum wheat imported from Italy are France and Greece, but with much smaller amounts compared to Canada.

Additional factors that could explain the massive import of durum wheat in Italy, can be connected both to the strong volatility in food commodity prices and to changes occurred during the years of the Common Agricultural Policy (CAP) promoted by the European Union.



Cauntries	Absolute Value
Canada	1113
France	399
United States	303
Mexico	295
Greece	272

Figure 6: Import Italian durum wheat, 2015(Million euro)

Source: Elaborations on data CSConfagricoltura, 2015

Regarding the first highlighted aspect, what should be emphasized is the recent fall of the grain prices on the international markets. The revenues for farms, in fact, are no longer sufficient to offset the costs and this causes the bankruptcy of some farms or the abandonment of the durum wheat cultivation by others. This is because durum wheat, in particular, has a lower return than the common wheat (CS Confagricoltura). However,

this phenomenon is a structural aspect of the grain market, characterized by significant price volatility.

Years	**Price index**	**% Variations on previous year**
2007	179	-
2008	235	31,30%
2009	154	-34,50%
2010	169	9,70%
2011	214	26,60%
2012	204	-4,70%
2013	194	-4,90%
2014	181	-6,70%
2015	144	-20,40%
2016	127	-11,80%
% Var. 2008/2007	31,30%	
% Var. 2009/2008	-34,50%	
% Var. 2011/2009	39%	
% Var. 2016/2011	-40,60%	

Table 6: Indices of average prices of grain on world markets (average 2002-2004 = 100)
Source: FAO data on International Grains Council, 2016

In fact, looking at the trend of the indices of the annual average prices in the period 2007-2016 (FAO on the International Grains Council data) are evident the frequent variations that characterize grain prices. During the period, there were two peaks, in 2008 and 2011, followed by heavy downsizing that, in the space of a single year, exceeded 30%. From 2011 to 2016 the price index marked a further drop about 40% (Tab. 6).

The Italian market for wheat, and particularly for durum wheat, is heavily influenced by the global grain market. For example, soaring prices in 2007 is due to poor national harvest, accompanied by the low availability of the product at world level, which led the market price up to more than 500 euro per ton. Conversely, after the harvests of 2008, the scenario has completely changed, domestic production was very high as well as at global level, so prices are back to a very low level.

The high volatility of prices, as appears from the data, is a constant feature of the grain market. This is also a consequence of the increasing globalization of trade, often governed by commercial strategies, rather than on objective economic conditions (relationship between production and consumption). In particular, Italians farmers still have little power in the management of the stocks, which are handled by operators often driven by interests very far from those of primary producers.

A further feature of durum wheat regards the effect that the CAP had on it. Until 2004, in fact, durum wheat received a very high coupled aid (about 500 euro per hectare) from the European Union. This has conditioned the decisions of farmers, especially in Italy and Spain, and had a great influence on cultivated areas. In 2005, after Fischler Reform, aid being decoupled from production and from the crop choices of farmers, this resulted in a strong fall in durum wheat seeded areas (ISMEA, 2011).

The freedom granted by the CAP to agricultural enterprises in order to prefer the production of goods most frequently requested by the market if, on the one hand, has

reconnected the agro-food sector to market logic and relaunched competitiveness, on the other hand, triggered a process of partial abandonment of certain products, helping to create difficulties in the supply of raw material intended for those involved in the later stages of food chains (Velazquez, 2005). Within the cereal sector, the production of durum wheat which received highest financial aids than other crops (to offset the diseconomies resulting from soils low productivity, due to inability of alternative crops) has suffered greatly after the decoupling aid, and this led to a sudden restriction of the supply (ISMEA-Italmopa, 2011).

Logically this had great influence on the amount of durum wheat produced in Italy. Nevertheless, there is another cause that explains the reason of the large imports of durum wheat. This cause is connected to the quality of the culture, that much influence the market choices. The quality of Italian durum wheat, in fact, not average, satisfies the internal needs, due to black point and insufficient protein. For this reason, Italy imports durum wheat even when, from a strictly quantitative point of view, would appear self-sufficient. The country is, therefore, forced to import higher-quality durum wheat to mix with the poor quality obtained from domestic production.

The other food commonly used in the preparation of pasta with tomato sauce is, of course, tomato and especially processed tomatoes.

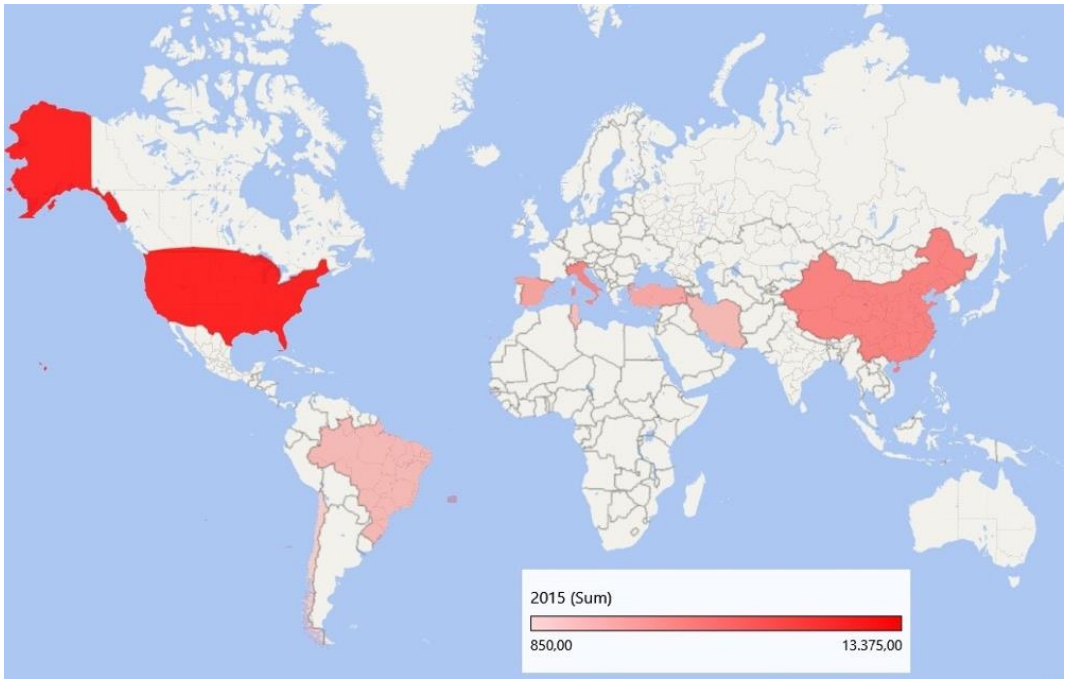


Figure 7: Processed Tomatoes major manufacturers, 2015
Source: Elaboration on data World Processing Tomato council -WPTC-, 2016

The first three world producer of processed tomato are the United States, particularly California, China and Italy, followed by Spain, Turkey, Brazil, Iran, Tunisia and Chile (Fig. 7).

In Italy the tomato processing activities, as well as the production of the agricultural raw material, is highly concentrated at the regional level. The transformation of tomato, in fact, is concentrated in two regions, Campania and Emilia Romagna. In Emilia Romagna both production and processing of tomato take place at local level, maintaining, therefore, a good balance between the production area for the supply of the agricultural raw material and the area of industrial processing; the region is also characterized by a

high production of tomato paste (Lombardi, Verneau, 2008) compared to other types of derivatives (peeled, tomato pulp, tomato puree). The scenario is different in Campania, where the tomato processing is much more fragmented. In this region, in fact, there are about 100 factories most of which are located in the Agro Sarnese-Nocerino. They, compared with the Emilian competitors, have a lower average processing capacity (approximately 3000 tons per year) and mainly focused on the production of peeled tomatoes, market in which they have a monopoly position. In Campania, almost all of agricultural raw material comes from Puglia, which completes the production chain on supra-regional scale.

With regard to the Italy import/export flows in 2015, Table 7 shows a basic balance between imports and exports of tomato processed taken as a whole. The most exported product is peeled tomatoes which covers over 60% of exports.

However, the situation changes when analyzing trade flows of tomato paste. This kind of product, in fact, is characterized by a very high negative balance caused by substantial imports, of which more than 40% comes from China (ISMEA, 2016).

	Export		**Import**		**Balance**	
	Value (€)	% var. 2015/2014	Valore (€)	% var. 2015/2014	Valore (€)	% var. 2015/2014
Fresh/ processed vegetables	3.584.767,90	6,1	2.346.973,60	9,1	1.237.794,30	0,9
Tomato processed	1.569.804,20	2,8	191.482,20	20,8	1.378.322,00	0,7
Tomato paste	103.392,70	-8,6	135.525,30	35,2	-32.132,60	-349,2

Table 7: Tomato processed import / export Italian 2015
Source: Elaboration on data ISMEA, 2016

Imports of tomato paste from China showed a strong growth trend (Fig. 8). These imports increased by 423% in just three years, from 2013 to 2015 (ISMEA, 2016).

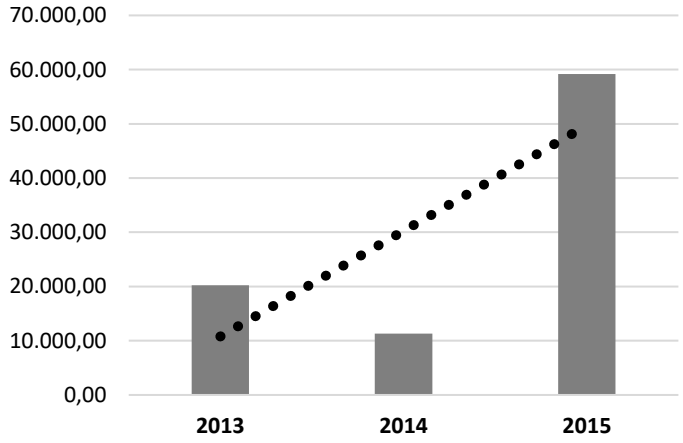


Figure 8: Increased Italian imports of tomato paste from China, years 2013-2015
Source: Elaboration on data ISMEA, 2016

Although a preponderant share of imported tomato paste is then exported, after being perfected through a rework process (ANICAV, 2016), should not be underestimated the risk that the Made in Italy could run. In fact, on the labels of cans intended for distribution channels, there is only an obligation to indicate the place of packaging and not that of cultivation of the raw material. However, the most striking fact that is true both for durum wheat and concentrated tomato, is the significant loss of weight of agriculture in the supply chain, especially when one considers the food products passing through the transformation. Indeed, in the total value chain from field to table, the share of agricultural producers fell over the past decade from 8.5% to 6% (ISMEA, 2010). Conversely, is the stage of distribution, in particular the GDO, to capture a growing and by far predominant share of the value paid by consumers. The analysis of imports of durum wheat and tomato paste, points out that there is a gap between the local food culture and the true origin of the raw materials processed.

Both categories examined in fact belong to the components of the DM foods list, but, in both cases, were found large quantities of imports, predominantly from non-Mediterranean countries. This creates, therefore, a loss of identity, which is reinforced when the consumer buys a product without the ability to receive all the information related to its traceability. Currently the legal reference at European level in which it is addressed the problem of the origin is the U.E. Regulation 1169/11. That Regulation has introduced a definition (rather tautologically) of "place of origin", corresponding to "any place indicated as being that from which comes the food." The notion is distinct from that of "country of origin", which, however, refers to the origin of that product (as determined in accordance with Articles 23 to 26 of Regulation (EEC) n. 2913/92). This is the place where the goods were wholly produced and, in the case where two or more countries have contributed to the production process, the place where it underwent its last substantial transformation. This is a new departure from previous requirements which spoke about the "place of origin or provenance" without specifying at all what was meant by these terms or the terms in which they were alternatives. It is, therefore, clarified that the origin is the one obtainable from the rules of the European Customs Code. The strangeness of this provision of law is the reference to the Customs Code of 1992, which is now repealed (Borghi, 2014). The European legislator added, then, a further and important clarification. Namely that relating to the fact that the applicant's name, business name and address of the food business operator placed on the label (indication that applies pursuant to Art. 8 of the regulation to identify who is commercially responsible) can not be understood as a surrogate indication of the country of origin or place of provenance. These are two completely different directions, with different purposes.

However, there is no obligation of indication of origin on the label for all types of food, provided that its omission would not mislead or confuse consumers, in this case it becomes obligatory.

The aforementioned 2011 EU regulation adds to the typologies already covered by the earlier Regulations (beef, fresh fruit and vegetables, eggs, honey, fresh milk, chicken, tomato puree, olive oil used) the fresh meat from pigs, sheep, goat and poultry, processed meat, as well as other types of meat and dairy products. However, many foods are still excluded, for example, rabbit meat, fruit and vegetables transformed, the cheeses, but also the pasta and the derivatives of tomato different from the past (eg. Concentrated tomato). In Italy, recently, the Ministry of Food and Forestry Policies has proposed a decree that introduces the mandatory indication of the origin of the durum wheat for pasta industry.

The measure, which is still pending before the European Commission, responds to a growing need for transparency and information to consumers and will allow for more clarity on the origin of the wheat and semolina that characterize the quality of pasta made in Italy.

4. Conclusions

The identity of a place can be found in the dishes that are brought on the table. The tastes and smells of the food show the special features related to land, climate and culture that define the different territories.

The analysis proposed here showed that the processes of globalization, affecting the deterritorialization of products, end by detaching consumers from their local food culture. This is more accentuated by the lack of transparency with respect to traceability of products sold in the retail channel.

At this point, one might ask, what remains of the Mediterranean in the Mediterranean diet? One can not answer this question only by looking at the agri-food trade flows. One must take into account the tradition, culture and knowledge that, as in the case of the production of durum wheat pasta in Italy, are part of the territorial milieu and can not be imported or exported. Therefore, there is still much of Mediterranean, in spite of everything. The hope is to be able to value even more the products that are part of the local traditions and, above all, make it fully transparent on labels the traceability of agricultural raw materials and, in general, of food products, in order to provide greater awareness to the consumer.

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ISMEA, Istituto di Servizi per il Mercato Agricolo Alimentare: www.ismea.it

ISTAT, Istituto Nazionale di Statistica: www.istat.it

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CLIMATE CHANGE AND LIVESTOCK PRODUCTIONS SYSTEMS: A CASE STUDY IN NIGER OF TECHNICAL AND DIDACTIC ACTIVITIES

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Abstract

Livestock systems in Sahelian countries are changing rapidly in response to a variety of drivers, such as growth of human population and urbanization and a huge increase of the global demand for livestock products. Such changes will impact on the future availability of natural resources, with negative consequences on animal and human health. Moreover, the climate changes will have significant consequences on food production and food security. This paper reports the results of some cooperation projects aimed both to optimize livestock management and productivity in a context of environmental stress and to strengthen the educational offer of local universities.

1. Introduction

As a result of the continued growth of the human population (with an estimated of more than 9 billion in 2050) (Cohen, 1995), a huge increase in the demand of animal production is expected in the next decades. Food and water security will be one of the priorities for humankind in the 21st century.

Over the same period the world will experience a change in the global climate that will cause shifts in local climate that will impact on local and global agriculture.

In this context, we have to expect that the livestock systems based on grazing and the mixed farming systems will be more affected by global warming than an industrialized system. This will be due to the negative effect of lower or irregular rainfall and more severe droughts on crops and on pasture growth and of the direct effects of high temperature and solar radiation on animals.

These systems exist mainly in developing countries where the human demand for animal products is increasing due to the higher and continuous growth in the population and per capita consumption. A loss of 25% of animal production by global warming is foreseen in these countries (Nardone *et al.*, 2010).

A worse scenario is foreseen for Africa, and in particular for sub-Saharan Africa, where extensive or pasture based systems remain the norm.

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The challenge will be how to better balance either the increase in the number of stock or the productivity per head, at the same time improving the sustainability of the livestock sector.

Indeed, animal production has to increase in the next decades to satisfy the growing need, according to the trends in consumption of livestock products, as showed in figure 1.

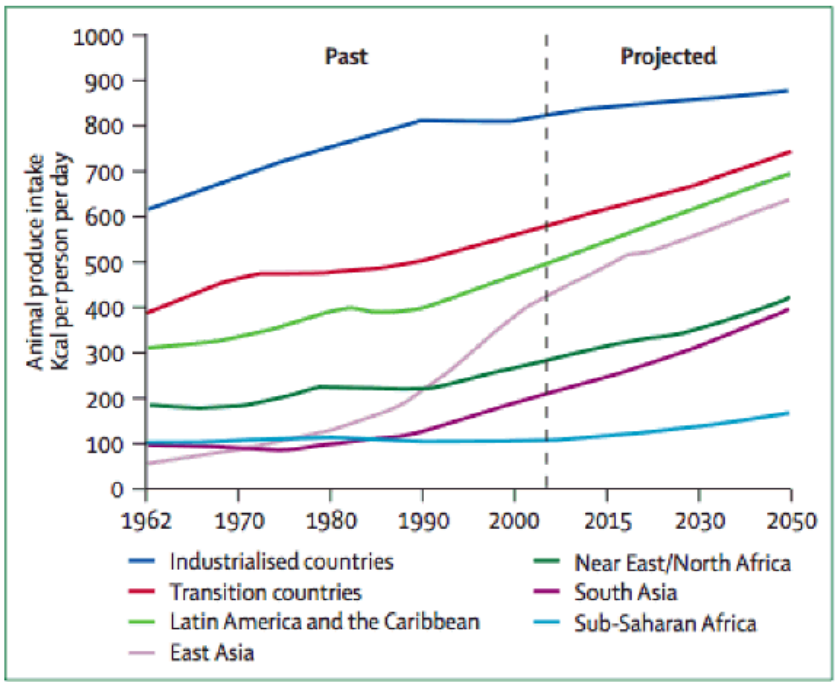

Figure 1. Trends in consumption of livestock products per person in different regions. Source: McMichael et al. (2007).

For more than 10 thousand years, farm animals have contributed to human needs for food and agricultural products: meat, dairy products, eggs, fibre and leather, draft power and transport, and manure to fertilize crops and for fuel. These animals have always played a large cultural role for livestock keepers. Livestock also play an important economic role as capital and for social security.

In most parts of the developing world, difficult environmental conditions and a lack of availability of capital, technology, infrastructure and human resources have not allowed intensification of agriculture, including development of genetic resources. On the other side, harsh climate, insufficient feed of low nutritional value, irregular feed availability, diseases and lack of education and infrastructure have kept the agricultural output per animal at a low and rather unchanged level for a long time. However, livestock breeds in the tropical parts of the world during thousands of years have become adapted to cope with harsh environments, including disease challenges, and to produce under conditions in which breeds developed in more favourable environments will not even survive. Such differences among animal populations have a genetic background and are the result of the interaction between genetic constitution and environment. This has evolved over time from natural and human selection of animals for performance in different environments that originated such a variety of indigenous breeds. However, when appropriately utilized in pure or cross-breeding programmes, indigenous breeds can contribute to increased productivity in smallholder production systems.

Figure 2. A transhumant herd in Niger (photo C. Semita, 2009)

The challenge now is to find ways to exploit the potential for improved and sustainable livestock production. This result could be obtained enhancing the variability among and within the indigenous breeds and the different environments and production systems in various parts of the tropics and sub-tropics.

Non-structured cross-breeding of indigenous breeds with imported high yielding breeds has been practised too often in the tropics, sometimes with disastrous results (Philipsson *et al.*, 2011).

Moreover, it is rightly argued that animal production systems, especially with ruminants, contribute to undesired methane emissions. However, it is also well established that these greenhouse emissions can be substantially reduced by increasing productivity and lowering the number of animals kept for a given total amount of produce. Hence, increased productivity per animal concentrating production on fewer but more valuable animals is a further way in reducing the negative environmental impacts of livestock production. This intensification, however, must also be designed to effectively manage all other risks to environmental degradation of land and water.

Another problem that affects livestock and pastoralism as dominant economies of sub-Saharan countries is social and political insecurity: the Northern parts of the Sahel and the Sahara have seen a rapid recrudescence of trafficking and other illegal activities. Some areas are now home to extremist groups, several of which are involved in terrorist activities. The insecurity and instability in these areas lead directly to increasing poverty for already poor pastoralists, and have a ripple effect on the economic wellbeing of the entire population of the Sahelian countries. While only a very small part of the population is thought to be directly and actively involved in these criminal activities, it is critical to understand whether that large part of dry land peoples, that is not directly involved, is vulnerable to these kinds of activities.

The development of pastoral economies and livelihoods is indeed an important element contributing to stabilization in the Sahel, and in particular to acquire the

cooperation of the pastoral population in the control of illicit and extremist activities (De Haan *et al.*, 2016).

This paper presents an analysis of some relevant effects of global warming on livestock production, the adaptation perspectives and strategies and the results of some international cooperation projects carried out in West African Countries, and in particular in Niger, by the Interdepartmental Centre of Research and Technical and Scientific Cooperation with Africa (CISAO) of the University of Turin (Italy).

2. Climate characterization, variability and change in West Africa

A main characteristic of the West African region is the strong variation (spatially and temporally) in rainfall quantity and distribution, long-term averages ranging from 150 to 1,200 mm year-1: under 150 mm in the Saharan zone, 150–400 mm in the Sahelian zone, 400–600 mm in the Sudano-Sahelian zone, 600–900 mm in the Sudanian zone and 900–1,200 mm in the Sudano-Guinean zone.

Prolonged dry seasons (up to 10 months annually) with high evaporation rates rotate with short rainy seasons, but regularity is not assured.

For all West African arid environments, rainfall data for the period 1960–1990 show a rather dramatic decline in average precipitation: analysis of rainfall variability and drought risk for this period revealed a high drought risk due to reduced precipitation.

The same trend, but with greater speed, occurred from 1990 to 2010.

Projections for future changes are mixed, however recent studies suggest a trend with a severe increase in drought risk, due to a reduction in the duration of the rainy season, but increasing of the amount of rain fall and consequently a drying trend that will affect rural productions (Nardone *et al.*, 2010).

3. Impact of climate changes on livestock

Climate change, particularly global warming, may strongly affect production performances of farm animals and impact worldwide on livestock production. Heat stress is a major source of production loss in the dairy and beef industry and whereas new knowledge about animal responses to the environment continues to be developed: managing animals to reduce the impact of climate remains a challenge.

3.1. Impact of climate changes on livestock production systems

Climate change and variability will affect land-use and land cover as a result of strong interactions between environmental and socioeconomic drivers of land-use, which define vulnerability and resilience of each productive system.

Adaptability represents the key tool to improve sustainability of livestock production systems under the pressure of climate and weather factors. An advanced planning of production management systems is required, with an understanding of animal responses to thermal stress and ability to provide management options to prevent or mitigate adverse consequences.

The main questions regarding the influence of climate change on livestock systems are: how much the different livestock systems are dependent on climate, which components of these systems will be mainly affected and what can we do to cope with these effects.

The level of dependence on climate estimates the quality of animal performance, health, welfare, nutrition and production may be affected by the climatic conditions in a short or in a medium period in each system.

In the extensive production systems constraints due to climate stress are substantial, aggravated by current degradation of natural resources, poor access to technologies and lack of investments in production (e.g. infrastructures). The increase of climatic variability will exert a strong influence on pastoral systems, even though they have developed the capability to cope and adapt to climate uncertainty.

However, since pastoral systems are totally dependent on availability of natural resources, the increase of inter-annual and seasonal variation of forage availability will contribute to reduce the overall sustainability, both from a socio-economic and from an ecological perspective.

Figure 3. Bororo cattle in Niger, a local breed (photo C. Semita, 2005)

The reduction of vulnerability of grazing/pastoral systems to climate changes should be based on the analysis of specific characteristics of the systems adopting new technologies (i.e. remote sensing) to evaluate feed and water availability, movement of the flocks, to establish feeding strategies to be adopted during exceptional events in connection with local decision-making processes.

The efficiency of water utilization will be another primary mission necessary to achieve sustainability of animal agriculture in expectation of increasing water scarcity and worsening quality (Nardone *et al.*, 2010).

3.2. Impact of climate change on animal health

Climate change, in particular global warming, affects the health of farm animals, both directly and indirectly. Direct effects include temperature-related illness and death, and the morbidity of animals during extreme weather events. Indirect impacts follow more intricate pathways and include those deriving from the attempt of animals to adapt to thermal environment or from the influence of climate on microbial populations,

distribution of vector-borne diseases, host resistance to infectious agents, feed and water shortages, or food-borne diseases.

The acclimation of the animals to meet the thermal challenges results in the reduction of feed intake and alteration of many physiological functions that are linked with impaired health and the alteration of productive and reproductive efficiency.

3.3. Impact of climate change on reproduction

High environment temperatures may compromise reproductive efficiency (hormone secretion, fertility, embryo development, lactation, etc.) of farm animals in both sexes and hence negatively affect milk, meat and egg production and the results of animal selection.

Over 50% of the bovine population is located in the tropics and it has been estimated that heat stress may cause economic losses in about 60% of the dairy farms around the world (Nardone *et al.*, 2010).

4. Inter-academic Cooperation to increase animal production and to ensure food security

Considering these assumptions that concerns lots of Sahelian Countries, included the Republic of Niger, improving the productivity becomes a goal to achieve in order to meet the population needs of animal products on one hand and to improve the incomes of farmers and cattle breeders on the other hand.

One way to improve animal production in the extensive systems is to develop selection programmes of animals, well adapted to pre-existing environmental conditions, to increase the strategic use of such breeds applying simple technologies and to strengthen feeding and management practices.

The use of reproductive technologies, in particular artificial insemination (AI), will become increasingly important to meet the growing demand for accelerated genetic improvement of extensively managed herds in Sahelian regions.

Numerous breeding programs using local breeds, based on first-generation biotechnologies (such as AI, a powerful tool for disseminating widely used genetic material in the world), are being developed to increase the productions (milk and meat) of local cattle breeds.

AI is a breeding technique consisting of collecting the sperm in the male and introducing it into the female's genital tract. The collected semen may be used immediately or after a period of preservation in refrigerated or frozen form.

AI has multiple advantages including technical advantages (a rapid diffusion in time and space of high genetic animals, biodiversity preservation); economic benefits (decreasing the number of breeding sires on the farm, saving feed and maintenance costs and reducing their environmental impact on pastures, and improving herd productions); health benefits (prevention of contagious and/or venereal diseases and better control and early diagnosis on the herd).

Despite these advantages, an uncontrolled use of AI may present disadvantages of several kinds: genetic (increasing consanguinity, loss of biodiversity); economic (high genetic animals are more demanding for maintenance, in particular food and health monitoring); sanitary (dissemination of certain diseases and genetic defects).

The need for clear strategies on the improvement and maintenance of indigenous cattle genetic resources is required along with clear breeding programs for sustainable genetic improvement. To date, AI is recognized as the best biotechnological technique for increasing reproductive capacity and has received widespread application in farm

animals. Despite the wide application of AI and its success throughout the developed world, as a matter of fact, the success rate in Sub-Saharan Africa is still low owing to a number of technical, financial, infrastructural and managerial problems (Mekonnen *et al.*, 2010; Thornton, 2010).

Although decades have been passed since AI started also in Africa, there are few statistics about the worldwide distribution of AI and there are field studies made to evaluate the reproductive performance of cows/heifers subsequent to AI and the sustainability of the use of this technology in Africa (Mekonnen *et al.***,** 2010).

World statistics for AI in cattle reports that the diffusion in Sub-Saharan Africa, considering semen doses processing (semen collection centres, local production and importation) and total number of inseminations, is only marginal, except for the Republic of South Africa (Thibiera *et al.*, 2002; AFCAS-FAO, 2015).

The factors that influence the success, the diffusion and the sustainability of the AI include:

a) Reliability of services;

b) Availability of trained staff and farmers in all the steps of AI breeding programs;

c) Source of bulls or semen, not only imported but also locally produced;

d) Affordable prices and charges of equipments and services (Mpofu, 2002).

Improvements in animal health and livestock management, and training of farmers and officers are the requirements for AI can be fully exploited.

To increase and strengthen livestock in Niger, the Faculty of Veterinary Medicine and the CISAO (Interdepartmental Centre of Research and Technical and Scientific Cooperation with Africa) of the University of Turin, in collaboration with the Faculty of Agronomy of the Abdou Moumouni University of Niamey and in agreement with the Ministry of Animal Resources, initiated and implemented some projects to strengthen the livestock sector in Niger, to promote the diffusion of AI to increase local breeds productions (Azawak zebu and Kouri cattle), financially supported by the Piedmont Region and the Italian Cooperation.

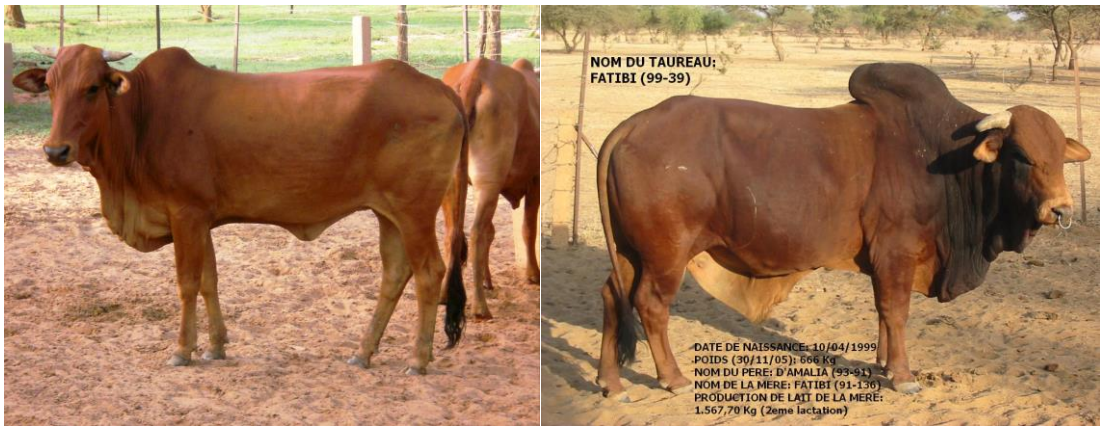

Figure 4. A cow and a bull of the Azawak zebu in Niger (photo C. Semita, 2005)

The overall objective of these projects is to participate in the national food security programmes by improving livestock production (Cristofori *et al.*, 2005; Marichatou *et al.*, 2010; Issa *et al.*, 2010a; Issa *et al.*, 2010b; Issa *et al.*, 2013; Semita *et al.*, 2014a).

Specific objectives are:

- The creation of the scientific and technical bases for the future modernization of milk and meat production methods in the cattle breeds of Niger;
- The establishment of a sperm bank for the Azawak breed and other local breeds;
- The dissemination of a performed genetic using selected breeders in AI programmes;
- The extension of the practice of AI and the organization of educational programmes for local technicians;
- The dissemination of project results and replication of experience in other contexts and other races (e.g., project to preserve the Kouri taurine race, typical of the Lake Chad area) (Semita *et al.*, 2011).

The achieved results are:

- The diffusion of the AI technique to improve animal productions;
- The progress of herd management (both for selection, nutrition and health programmes);
- The improvement of milk and meat production, increasing social and economic conditions of the rural population;
- The development of animal production systems with a particular focus on sustainable natural resources management;
- The contribution to the preservation of autochthonous breeds and the cultural identities of local populations of breeders that depends on these animals;
- The training of technicians able to perform semen collection of selected bulls, semen processing and freezing and the AI with a wider consciousness of the links between the different areas involved in rural development (natural resources management, water availability, grazing and soils management, human and animal health, food conservation, transformation and commercialisation, etc.) (Nervo *et al.*, 2014).

On the basis of the positive experiences of these projects and following the inputs from numerous other partners and funders, some national or international programs for the improvement of livestock production have been processed and activated by the government authorities in Niger.

For example, the West African Agricultural Productivity Program - WAAPP (in French *Programme de Productivité Agricole en Afrique de l'Ouest - PPAAO*, was initiated by the Economic Community of West African States (ECOWAS) with the financial support of the World Bank, to improve agricultural productivity while promoting regional integration as instruments for promoting poverty reduction in West Africa. The general objective of WAAPP is to contribute to increasing the agricultural productivity of priority sectors at both national and regional levels. In particular, the program aims at generating and disseminating improved technologies in the priority sectors of the region as listed in the strategic plan 2007-2016 (roots and tubers, rice, dry grains, livestock / meat, cotton, fruit and vegetables, etc.) and to create favourable conditions for regional collaboration. Therefore, identifying mechanisms and best practices to improve diffusion and adoption

of technologies and innovations is paramount for their better access by end-users in order to increase agricultural productivity diffusion.

In Niger, this programme supports the livestock sector, in particular strengthening meat and milk productions, promoting and developing AI.

Another program that promotes the breeding in Niger is the National Program for Genetic Improvement / Local Bovine (*Programme National d'Amélioration Génétique / Bovins Locaux PNAG / BL*), adopted in March 2011 with the aims to contribute to the preservation and improvement of the genetic potential of local cattle breeds while increasing their milk and meat production performance.

The implementation of this national program is based on a pilot phase of 14 years, in two programming cycles of 7 years each. The program is built on five components:

- genetic improvement,
- feed and forage production,
- animal health,
- capacity building,
- management (Marichatou *et al*., 2011).

In the context of sustainable development programs the role of universities as engines of development is undeniable. However, African higher education institutions (HEIs) are facing enormous financial and social problems: a low schooling rate, outdated infrastructures, inadequate financial, political and logistical support and occasional relationships between industry, government, social and productive sectors of the economy. For these reasons, under the project RUSSADE (FED/2013/320-115) (Semita *et al.*, 2014b; Barge *et al.*, 2015) founded by the EU in the ACP-EU cooperation programme in higher education (EDULINK II), the CISAO of the University of Turin, in collaboration with the universities of Burkina Faso, Chad and Niger, organized a specific Master to prepare a skilled staff for strategic positions in the technical structures of ministries, training and research institutions, enterprises and NGOs in the fields of rural development. Educational multidisciplinary programs should face challenges and difficulties of the agriculture in the Sahelian region to enhance capacities in various strategic fields: livestock productions, food security and safety, environmental preservation. The Master trains technicians able to contribute to the development process considering the interactions between different issues and increasing the awareness towards a sustainable management of environmental resources.

Courses and training activities take place in an innovative higher education vision, offering an integrated and interdisciplinary handling of themes concerning sustainable rural development in cyclical vision structure, coordinated and shared by Italian and African teachers together.

Moreover, the project recommends measures designed to strengthen the capacity and effectiveness of higher education, to promote basic and applied scientific research, to improve educational quality through updated teaching methodologies and to improve administrative management of the HEIs (Semita *et al.*, 2015a).

Another main methodological concern is the dissemination of sustainable and appropriate technologies. To achieve these results a network between the HEIs are reinforced, also encouraging the exchange of academic staff and students, creating a more favourable environment for debate and innovative research and promoting a greater

awareness of the connections between human choices, natural processes and environmental modifications.

The main result of this training is the acquisition not only of technical skills, but also of a deep awareness of local issues, taking into account that a local intervention affects the entire region.

Both theoretical and practical training strategies were adopted to transfer competences to all educational levels: higher education, technicians and farmers. The didactic methodology always developed a multidisciplinary and interdisciplinary approach.

The didactic and educational approach was evaluated submitting questionnaires to students, teachers and responsible for internships with regard to both technical and pedagogical analysis methods in relation to the improvement of the impact of a such learning process.

Teaching evaluation included collecting feedback for teaching improvement, developing a portfolio for job applications, and verify the relevance of this didactic programme.

Courses and training activities will take place in an innovative higher education vision, offering an integrated and interdisciplinary handling of themes concerning sustainable rural development in cyclical vision structure, coordinated and shared by Italian and African teachers together.

This evaluation showed a really good impact of the education and a good recruitment rate of the students of the first promotion.

Figure 5. The students of the Master implemented in the Project RUSSADE during a study tour in the Transnational Park W (Niger, Burkina Faso, Benin)

Teachers and researchers are stimulated to master the latest scientific and methodological knowledge in their own fields and also to create a positive interdependence with students by promoting teamwork (Semita *et al.*, 2015b).

This procedure aims to develop a sense of personal responsibility, encourages the acquisition of cognitive and social skills and increases the motivation to learn and solve complex problems Understanding the links between learning, research and professional

practice opens new perspectives: the capacity to face problems in a systemic way in different contexts and to acquire professional skills to respectfully work on different environmental components (Ferrero *et al.*, 2016).

5. Conclusions

Artificial insemination is a comparatively sophisticated method of animal husbandry. Its impact on cattle development is closely linked to the simultaneous introduction of reasonable standards of animal nutrition, disease control and husbandry, linked to a sustainable management of natural resources, in particular pasture and water. Unfortunately this has not always been recognized, and in some cases A.I. has been adopted purely as a technical method of getting cows in calf. The aim of cattle improvement has usually failed in such cases.

Anyway, the results from the AI programme in Niger indicate that it is highly feasible to introduce AI at "local level", taking same cautions. For example, to guarantee their sustainability, these systems must emphasize effective resource input/output ratios and more integration of livestock and crop production rather than industrialized mono-cultural production systems that seriously challenge the wise use and care of our natural resources.

Figure 6. A Kouri cattle bull, local breed in Niger.

Another important aspect is connected with training and educating technicians and farmers in the really benefits and constraints of the use of new technologies in livestock systems in Sahelian countries and their connections with all the other areas involved in rural development.

Farmer training is an important tool widely utilized by development programs in the Sahel, by matching workshops and seminars, on farm training and demonstrations and field visits.

Training in animal management (health, reproduction and nutrition) is desirable to farmers as they are often eager to improve their knowledge and practices and to have their knowledge affirmed by professionals.

Farmer training and support seem to have had an impact on animal health, livestock consumption, and sale. Trainings are an avenue for development workers to pass on new information and to correct miss-conceptions concerning animal management. Organizations that give animals to farmers usually require that the farmers receive some training before they are given the animals (Ampaire *et al.*, 2010).

Moreover, awareness creation on farming community is necessary to promote a enhanced herd management and the utilization of AI and different strategy for a sustainable use of natural resources to improve animal productions.

An emphasis should be also placed on the importance of the relationship between traditional knowledge, acquired from centuries of experience of the local population , and scientific awareness, by applying scientific knowledge to useful traditional practices.

The evaluation of the didactic and pedagogical approach is another important step to create educational programmes able to respond to the local needs and requirements in term of skilled professionals and technicians.

For the success of similar projects, where university research plays a major role, it is crucial that innovative actions and results do not remain confined to the academic world but that they are also disseminated to a larger scale to social and productive sectors of society.

Only in this way, the application of new and proper technologies could become a useful key element in the progress of development in Sahelian countries to ensure food security and environmental sustainability.

6. Acknowledgements

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SHARING BEST PRACTICES AND EDUCATIONAL TOOLS AMONG COUNTRIES OF SAHEL

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Abstract

Management of natural resources is a major challenge in Sahelian countries. Didactic panels are a very useful educational tool to help teachers soliciting student's attention and general public curiosity. Panels used in Italian schools were adapted and tested in Cape Verde educational environment and will be permanently exposed in an exhibition building. Topics like ecosystems protection and preservation, establishment of protected areas, enhancement of water resources, groundwater defence from salinization, pollution associated with inadequate waste management, are suitable to diffusion in schools of Niger, Chad, Burkina Faso, as dissemination action of Project RUSSADE, Master "Sécurité alimentaire et durabilité environnementale".

1. Introduction

Someone assumes that anthropogenic actions may govern the modifications that the actions themselves determine on the territory and may control their effects on ecosystems, but this is often not true.

Human concerns may ignore or even despise the limits of the territory, that are well defined by physical laws, limits that become tight and binding when connected with the effects of climate change. Management of natural resources is a major challenge in the Sahelian countries.

Considering that education is highly effective aiming to contrast the environmental degradation, especially when conflicts between natural processes and human needs develop, many efforts were done to improve educational strategies in cooperation projects.

All the geosphere is involved, defined as the components of the Earth system constituted by the land surface, the solid Earth, the hydrosphere, the cryosphere and the atmosphere. This implies ethical obligations, ethical responsibility by all researchers, geoscientists, educators and decision makers and requires a more active role while interacting with society (see Peppoloni and Di Capua, 2016).

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The adoption of ethical principles in research, practice and education is essential if scientists want to best serve the public good. Geoethics which investigate the ethical, social, and cultural implications of the sciences related to GAIA, the mother Earth, represents a new way of thinking about and practicing Earth sciences, focusing on issues related to the relationship of the scientist with the self, colleagues, and society in the broadest sense.

1.1 *Goals*

In this paragraph the most relevant goals of projects, actions and related research are defined, focusing on education and communication, goals recommended during the Pan-European days of environmental education towards sustainability, held in Barcelona (Manifeste, 2015):

(1) Promote the exchange of experiences and knowledge.

(2) Strengthen the relationships between institutions and associations in order to identify shared interests and encourage future partnerships.

(3) Create a common space regarding the role of the environmental education and the future challenges.

(4) Encourage the construction of joint projects among different regions, through the development of environmental education policies both at national and international level.

According to the Manifest of the Education for the Environment and Sustainable Development (EESD), this kind of education aims to stimulate critical thinking and to develop values for a better living together. Specifically:

- it aims to strengthen the capacity of every citizen, including the less wealthy, to better perceive environmental issues and to participate in the life of the city by acting individually and collectively;
- it aims to train for a participatory debate in order to prepare young and adults to lead a full role in the future of their territories, either locally or globally;
- it promotes a holistic and systemic approach and aims to develop complex thinking, in order to create responsible citizens who believe in the value of men's action with the capacity to take up their responsibilities in order to act at all levels;
- it aims, in a fundamental way, to (re)-establish strong connections between humans and nature and the environment;
- it makes this link to nature and to the environment a key element of learning.

2. Examples of activities

We introduce some examples of projects whose target were school students or general population, where education played a major role.

The actions were proposed in different countries (Italy, Cape Verde, Brazil) with various duration (from 1 to 6 school years) and developed in original and independent ways, but they were at the same time strongly interconnected (see Ferrero *et al.*, 2014a).

2.1. Twinning between Italian and Sahelian primary and secondary schools

A twinning between Italian schools and schools in Cape Verde was organized as a cooperative learning experience with a common educative path, addressing topics related to the vulnerability of the territory attacked by a tourist development often aggressive and disrespectful of local peculiarities and traditional values, as discussed in Camino and Ferrero (2015). The dialogue started with the initial goal of collecting data about the physical nature of the islands, in order to set up a museum of Nature Sciences with

educational purposes both for residents and tourists. But the project soon developed as a path sharing themes and educational goals and looking for common cultural roots, in particular exploring how students of different ages (6-15 years), perceived the physical environment of their country (see Ferrero et al., 2006a; 2006b). The work was articulated on the exchange of knowledge, ideas, proposals, documents and reports, in order to compare and broaden reflective moments in their respective classes (twinning) (Fig. 1).

Figure 1: Twinning between Cape Verde (left) and Italian (right) primary school classes.

Major themes of Earth Sciences, as volcanoes, earthquakes, floods, were the subjects of the exchange and of further deepening, but also the natural transformations of the landscape, the interference of human activities with natural resources, the collective and individual responsibilities involved in risk management.

The interaction and dialogue between Italian and Cape Verdean teachers were wide continuous, they had meetings for data analysis and interpretation, evaluation of the experience suggestions and proposal for the new steps. An analysis of the first papers (drawings and worksheets) of the involved students showed little interest and probably a lack of awareness of the problems concerned, while from the analysis of final papers a full awareness turns out of the human responsibilities and the possibility of changing the reality, the desire to address environmental issues and to adopt a more responsible lifestyle; finally, students recognize the usefulness of what was learned in the educational process performed, (see Ferrero *et al.*, 2010; 2011; Gimigliano and Ferrero, 2007). From the point of view of education-communication strategies, this experience demonstrates the crucial importance of performing practical and expressive activities followed by reflections and guided rework, to explicitly highlight the links of theoretic topics with everyday life, to use different forms of communication (verbal, written, graphic and artistic).

Figure 2: Exploring and discovering during field activity: classes of primary school on a geological outcrop in Piedmont, Italy (left), on recent lava flows of the Pico do Fogo volcano in Cape Verde (right).

The team explored and compared the spontaneous conceptions of Italian and Cape Verdean students on topics related to the physical natural environment and its changes over time, in connection with the presence of living organisms and in particular changes related with the human interference, to the discontinuous development of the natural processes, diluted in geological time, or concentrated in events considered "catastrophic". The job required a high ability of teachers to lead students without giving them the path, following them with respect and patience in their digressions and their fantasies (Magagna *et al.*, 2012).

2.2. Interviews

A parallel research was conducted investigating farmers, fishermen, small associations of agri-food processing, through interviews in the islands of Fogo, Santiago, S. Antão and S. Vicente (Cape Verde). The purpose of the research was to collect opinions about the availability of natural resources (water, land, energy), quantitative data related to the production for subsistence or for the marketing, the presence and efficiency of working tools, the waste management processing (Calvo *et al*., 2011). The choice of interviewees was decided with the aim of investigating the work habits, access to resources (natural, energy) and waste disposal of persons related to their native land not only for birth, but also for business choice: respondents are all resident in the workplace, and managers of small to medium production activities. They were subjected semi-open questionnaires, so as to collect some answers in a structured manner and also allow the recording of comments to open questions.

Figure 3: Interviews to farmers and agri-food producers and transformers in the island of Fogo, Cape Verde.

At first the material collected has allowed to have a first idea about the difficulty of managing the waste materials (so-called non-recoverable waste), but at the same time the interviews have revealed other problems: the increasingly urgent water shortages, the criticality of energy availability, environmental degradation caused by a more aggressive human impact. Not only problems, needs, hardships emerged, but also the awareness that 'something' changed over time, to the point that additional material was collected mainly investigating elderly people and highlighted what may be called the 'environmental memory' of the respondents.

The intrinsic value of this witness is not directly correlated with objective and measurable data, but it is very significant the way of thinking of each subjective and depends largely on age registry, the character and the past of their own lives.
Interviews with older people in some areas of Cape Verde allowed to trace ancient ways of working the land, to use the water, to select crop plants and were characterized by a deep understanding of territory. All this was introduced to the twinned classes, discussing the assumption that too fast transformations of social and environmental tissues are not always synonymous with progress.

2.3. Training seminars and refresher courses

While the twinning was progressing the objectives and expectations evolved over the years, due to a growing consciousness of the research group, which processed and analysed the products and used the results and the teachers' reflections to achieve a virtuous cycle of positive feedback. Also the class groups improved their performances, especially when the experience lasted several years.

Figure 4: Seminars and exchange of experiences between Italian and Sahelian teachers. Field work planning and experiencing (top) and teachers training activities (bottom) held in Italy and in Cape Verde.

Even if started with a very structured basic grid, the project was always flexible and modulated on the age of the students, the location (country school or city school), but above all on the type of educational relationship established by the teacher.
Teachers who took part in the experience, very well trained and motivated, developed unique and special relations with their specific class (Fig. 4).

As a result they produced a great variety of valuable outputs, not easily comparable in a strictly cognitive evaluation; their educational value could only partially be described by the qualitative analysis in the more concrete aspects of their content.
Starting from a relatively static perception of the characteristics of the physical environment, in the following years the activities aimed to recognize slow processes and highly dynamic events, to find out the reciprocal interactions between environment and human activities and to reflect on the effects of these interactions in time, as reported in Ferrero *et al*. (2006b) and Mortara and Ferrero (2006).
At the beginning students were mainly stimulated to develop the ability to observe, identify and describe, lately they improved the ability to recognize and interpret cause-effect relationships, complex interactions with many variables. At this point, as an effect of the proposed activities, other values and parameters came to the attention of the students. The ability to recognize connections between the environmental effects observed and the behaviours of individuals and communities increased, as well as the sense of individual responsibility.
Meanwhile, the socio-economic conditions in Cape Verde are going to meet a rapid change (Instituto Nacional de Estatística de Cabo Verde, 2007) which, together with a certain increase in well-being, have produced a large increase in imports and mass tourism products, not respectful and attentive to the risks of environmental degradation. In 2010, a secondary school Cape Verdean teacher proposed to develop in the partner classes comparative reflections on the themes presented by the Earth Charter. It is a statement of fundamental ethical principles, a document that mainly aims to recognize and protect the primary resources, suggesting strategies to achieve the transition to sustainable ways of living and human development. The goals mentioned by the Earth Charter Commission (2007) are: recognize the environmental protection objectives, poverty eradication, development of equitable economic, respect for human rights, democracy and peace as interdependent and indivisible. This perspective has provided an opportunity to open up to a global vision of issues already addressed at the local level, the proposal was received by Italian partners and the twinning of the last year has therefore addressed on this path.

2.4. Educational materials

Several panels on environmental issues were prepared for didactic use in schools and for widespread dissemination in rural areas. They were exposed in several Natural History Museums of Piedmont Region during the International Year of Planet Earth (2007-2009) as a complete educational path "To understand how the Earth work: from local situation to global processes" introduced by Ranzenigo and Ferrero (2006). The panels are grouped as two series: "To know for living with the volcano" (Fig. 5) and "Treasures and secrets of the coast environment in Cape Verde", documents that are posted in the Naturalist page of the website www.caboverde.com/nature. Translated in Portuguese these panels were delivered to the school districts of the islands of Fogo, S. Vicente and Santiago and used in primary and secondary schools.

Figure 5: An example of didactic panel. Protection and preservation of ecosystems through the establishment of protected areas: the case of the Caldera and the volcanic cone, Pico do Fogo, Cape Verde.

2.5. Establishment of a permanent cultural centre

Figure 6: The Auditorium of S. Filipe in the Fogo Island, Cape Verde.

The panels, updated and integrated after the eruption of the Pico do Fogo volcano (nov. 2014 - feb. 2015), will be exposed in the Auditorium of Fogo Island, a centre of cultural and educational opportunities for local population and tourists in Cape Verde, where thematic exhibitions on environmental resources and their protection will be located (Fig. 6).

3. College courses and training courses for adults

The experiences described are well identifiable as action-research projects that were introduced and discussed in several college courses of the University of Torino dedicated to teachers training of all levels and in Seminars and Workshops organised by Museums, Natural Parks and teachers Associations (Ferrero *et al.*, 2010).

3.1. The Project RUSSADE

A recent experience of interaction and cooperation with Higher Education Institutions (HEIs) of Sahel developed within the Project RUSSADE (Réseau des Universités Sahéliennes pour la Sécurité Alimentaire et la Durabilité Environnementale), active since 2013 thanks to a partnership between CISAO (www.cisao.unito.it) and three Universities of Sahelian countries, Niger, Chad and Burkina Faso, (www.russade.eu).

The guidelines of European Union for EDULINK II call for proposals indicate "energy facilities, agriculture and food security" as instruments to eradicate poverty and includes financial support in the educational field for strengthening the systems of higher education in African countries.

For these reasons, CISAO and its African HEIs partners are developing a project whose general objective is to use knowledge to fight hunger and poverty and to promote environmental protection in a sustainable development perspective. The quality of higher education in the field of agriculture and management of natural resources will improve food security and living conditions of Sahelian people. Another goal is to strengthen synergy between the partners through the creation of a permanent network, to enhance capacity, excellence and regional integration (Semita et al., 2014a, 2014b).

In this context is included the first edition of the II level Master "Sécurité alimentaire et durabilité environnementale".

To improve the impact of education on the quality of life of local population the outputs of the Master will be widely diffused in a larger part of the population, even if not highly alphabetized, to disseminate scientific and methodological instruments to manage natural resources in daily practices with an eye on environmental sustainability and equity (Ferrero and Semita, 2016).

Therefore the third period of the Project RUSSADE is mainly devoted to the diffusion of the results and their impact on the region, to the production of educational materials like panels designed also for primary and secondary school students, with the intervention of teachers, public officials and other staff of local associations, NGOs and other no profit associations (Semita *et al*., 2015).

Panels illustrate topics like "Enhancement of water resources to develop fisheries and crops", "Strategies to preserve vegetation and contrast desertification" (Fig. 7), "Pollution associated with inadequate waste management", "Protection and preservation of ecosystems through the establishment of protected areas" (Fig. 8). Panels are introduced in school and other public contexts and may be are integrated with practical activities (laboratory and field trips activities), to better involve students' attention and communicate an integrated vision of complex problems connected to development and environmental protection.

Figure 7: Strategies to preserve vegetation and contrast desertification (courtesy by S. Bechis)

4. Conclusions

At the end the twinning was perceived as a pleasant and enriching experience, giving teachers and students several opportunities: to plan common activities and include them in the curriculum, put the experience in educational paths, to make it an involving and functional component the students' knowledge increase; an enhancement of the affective and emotional components of learning, living them consciously as an added value; an exercise in patience and confidence waiting for the arrival of news and work items from the partners; an opportunity for feeling equally proud to be the protagonists of a special adventure, in which is a sort of peer education at distance is achieved and, from time to time, students take on the role of experts or recognize such a role in their partners.

Figure 8: Students of the Master RUSSADE during a study tour in the Transnational W Park (Niger, Burkina Faso and Benin)

The relationship established between students and teachers (and indirectly between families) of different cultures offers the possibility to take awareness of different ways of living and value systems, more directly of what happens through the media. twinning experience offered the opportunity to look out beyond the stereotypes and establish a real relationship, through the commitment to express the emotions and surprises derived from of incoming correspondence, exchange of documents, drawings and photos.

4.1. From Biophilia to Geophilia

Attention and empathy are the conditions upon which the Biophilia is based, and, at the same time, are two mental faculties that characterize the human instinct to love and care of living Nature, as introduced and discussed by Barbiero (2011). Can similar links develop between humans and the non-living elements of the Geosphere?

Extensive research conducted with teachers, students and the general public indicate strong similarities in attitude towards non-living components of nature, and this we call Geophilia (see Matteucci *et al.*, 2012; Lucchesi and Giardino, 2012; Ferrero *et al.*, 2014b). Therefore, attention and empathy, properly cultivated in the educational process, lead to a successful approach with the Earth Sciences and to a careful attitude for natural resources.

The experiences of twinning, with the corresponding educational programs, can be considered as a contribution to developing sustainable societies, in particular:

- sustaining the development of Geophilia through careful environmental education participation and awareness of the context - in order to become aware of the finite resources, defend them from destructive uses coming from the outside and / or inside;
- development of a relationship of mutual respect and mutual listening between different culture;
- on a personal level it is easier to take note of the differences, open minds and hearts in dialogue, develop empathy, cultivate a desire to learn in the relation.

4.2. Integrating different educational approaches

A rational approach to environmental problems, which takes into account only the knowledge of the facts, has proved insufficient and inadequate to motivate people to perform preventive or remedial actions.

It is more effective to develop also the emotional and affective aspects of knowledge to deal with environmental education issues and education for sustainability.

Considering the emotional links and relationships between human beings and the planet Earth, our HOME, a new way opens to learn, to understand and therefore to act in harmony with the laws of nature.

As a conclusion we recognise in the role and objectives of intercultural education the four pillars of education according to UNESCO Guidelines (2007).

- Learning to know, improved by the contact with other languages and areas of knowledge.
- Learning to do, meaning to acquire competence to deal with many situations and work in teams.
- Learning to live together, strengthen the understanding of other people, appreciation of interdependence, stimulates carrying out joint projects, learning to manage conflicts.
- Learning to be, invites to act with greater autonomy, judgment and personal responsibility.

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THE ENVIRONMENTAL ISSUE IN CHINA: NORMS AND ENFORCEMENT AFTER COP-21 CLIMATE SUMMIT IN PARIS.

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Abstract

It is well known that the dramatic economic development of China has had a severe impact on the environment during the past 30 years.

This paper shows an environmental picture of one of the largest country in the world, focusing on the legislative aspect and its evolution through time.

Then the study takes a glance through a relevant example of environmental issue: The Chinese Pesticide Legislation and its evolution.

Finally, the paper draws some consideration after the COP-21 climate summit in Paris, with an address to the outlook of environmental protection in China both in the cities and in the countryside.

1. Introduction

China's development in recent years (with a constant economic growth of more than 10% of the GDP per year) has made possible a significant increase of the quality of life for hundreds of millions of Chinese. The other side of the coin is that such development has brought enormous damage to the natural environment.

For several years, China, like many other developing countries, has widely tolerated the pollution growth, according to the principle “pollute first, control later”, and enacted laws with debatable effect in terms of control and enforcement.

The Chinese approach toward this phenomenon has a backlash over the whole world. China is the country with the largest population of the planet, which amounts to over 1.3 billion people, is the fourth country by area in the world and, according to many studies, is among the most polluted countries in the world.

The demand for energy, raw materials and natural resources of all kinds has grown out of control in recent years in China, growing exponentially at the growth of economic development. This has caused a variety of negative consequences on the environment, such as floods, desertification and loss of biodiversity.

The first step in the opposite direction, symptom of a rising awareness, was the China’s participation in 1972 to the "Stockholm Conference on the Human Environment". The first regulatory intervention in the subject, instead, came later in 1979.

This intervention was inefficient for various reasons: above all the unsatisfactory level of enforcement of the laws caused by the phenomenon so-called “local protectionism”.

Local protectionism[1] has plagued the Chinese legal environment and is still today a major concern for citizens and foreign investors, according to many scholars.[2]

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[1] That consists in administrations and courts deciding cases or enforcing judgements with a protective attitude in favor of local industries or local governments.

[2] Castellucci I. (2012), *Rule of law and legal complexity in the People’s Republic of China*, Università degli Studi di Trento, Dipartimento di Scienze Giuridiche, Trento.

Later on, the situation did not improve and in 2012/2013 pollution levels in Beijing and many other cities in northern China crashed far beyond the air quality indexes.

This so-called "Airpocalypse" provoked some government's policy responses.

In December 2012, the National People's Congress issued a law to require regional multi-pollutant air quality plans and new emission targets in 113 cities.

In September 2013, the State Council issued a Pollution Action Plan.

It is very unusual to see the Chinese government to announce a plan that does not coincide with the usual five-year planning cycle, but the extreme pollution clearly demanded decisive measures.

This plan required Beijing, Shanghai and Guangdong to reduce fine particle density respectively by 25, 20 and 15 percent by 2017.

Finally, the new Environmental Protection Law of the People's Republic of China (a national law formulated for the purpose of protecting and improving environmental, economic and social development) entered into force on January 1, 2015.

Further tangible sign of this effort was the Chinese participation at the 2015 Paris conference, COP21, in which it is appeared the incredible change in China's approach in the past decade.

The recently announced new Five-Year Plan commits China to produce 300 gigawatts of wind and solar energy by 2020. It is clearly an ambitious target if we think that Japan and Germany combined have set for themselves the same goal for 2030, a decade later.

China clearly seems no longer the laggard on environmental issues.

2. The evolution of Environmental Law in China, from 1950 to 2015.

According to the Article 2 of the 2014 Environmental Protection Law of the People's Republic of China, "Environment" refers to the total body of all natural elements and artificially transformed natural elements affecting human existence and development, which includes the atmosphere, water, seas, land, minerals, forests, grasslands, wetlands, wildlife, natural and human remains, nature reserves, historic sites and scenic spots, and urban and rural area.

It took many years and several reforms to reach this complete and comprehensive definition of "Environment".

Before 1976, in fact, any progress was hardly achieved in the field of environmental law.

During these years, the focus of the political level was the industrialization of the country and the economic growth, therefore only few environmental interests, connected with the manufacturing sector, were located, such as the regulation of mineral resources and factory safety, including provisions on water pollution prevention and waste disposal.

It was after severe floods and droughts, that a decision concerning environmental protection and improvement was issued, following China's signature of the 1972 United Nations Stockholm Declaration on the Human Environment.

In 1978, with Deng Xiaoping policy, environmental law, together with a greater awareness of environmental issues, began to develop in China. Important contribution to this progress came into force when the State's responsibility for the protection of the environment was added to the Constitution.[3]

[3] According Article 11 of the Constitution of the PRC (1978): "The state protects the environment and natural resources and prevents and eliminates pollution and other hazards to the public."

Then, a landmark in environmental law was the enactment, in 1979, of the Environmental Protection Law (EPL), an overall regulation of the subject, with a comprehensive set of sanctions.

Since the early 1980s, a gamut of environmental legislation has been issued.[4]

Then, in 1989, a renewed Environmental Protection Law (EPL) was enacted.[5]

After the renovation of the EPL, in the 1990s, China undertook new efforts to strengthen its environmental laws and to bring them into closer compliance with international principles.

The first generation of post-Cultural Revolution laws were revised, as well as new laws were enacted ruling on solid waste, noise pollution and other environmental issues.

New legislation covers different areas such as cleaner production measures and radioactive pollution. In addition, a wide range of local laws in the form of regulations, decisions, orders and quality standards have been issued at a local level since 1990.[6]

After a World Health Organization air quality study conducted in 1998, which shown that three of the ten most severely polluted cities in the world were located in China, and after extraordinary frequency and intensity of a dust storm in 2000, China adopted an amendment to the Air Pollution Prevention and Control Law.[7]

Then, the most significant innovation in the environmental field is the latest revision of the Environmental Protection Law, in 2014.

It was adopted at the eighth Meeting of the Standing Committee of the Twelfth National People's Congress of the People's Republic of China on April 24, 2014 and has entered into force on January 1, 2015.

This law has addressed many of the issued emerged during the lifespan of the 1989 EPL, and has taken into consideration some of the concerns expressed by other countries and supranational institutions.

Despite this law seem complete and coherent, it is still soon to evaluate its impact, since it largely relies on its dependable enforcement by Chinese authorities.

Other environmental norms, that pinpoint the so-called “Environmental Crimes”, can be found in the Penal Code enacted in 1997, in subsidiary criminal law, and in separate autonomous criminal laws.

[4] As Marine Environmental Protection Law in 1982, the Water Pollution Prevention and Control Law and the Forest Law in 1984, followed by the Grassland Law in 1985, the Air Pollution Prevention and Control Law in 1987 and the Wildlife Protection Law, enacted in 1988.

[5] This law was the basic law in the field for 25 years, covered many areas of environmental protection. Its provisions involved water, air, solid waste and noise pollution. It also provided environmental monitoring systems and methods of management responsibilities, including emissions recording methods, criteria for penalties, procedures for the evaluation of environmental impact, as well as measures for the control and elimination of pollution. This law also imposes on each individual or legal entity, a general obligation to protect the environment, by giving everyone the right to denounce those who damaged it. Finally, this law commanded that those who violated the limits established from time to time by the competent authority, were to be fined and obliged to remove the damage.

[6] Among these laws there was the Law on Water and Soil Conservation (1991), the amendment of the Water Pollution Prevention and Control Law (1996), the Solid Waste Pollution Prevention and Control Law (1995). During these years were also enacted new laws in the environmental field, such as the long-awaited law on Noise Pollution Prevention and Control Law (1996) and filled a significant gap in China’s environmental statutes, and the Desertification Prevention and Control Law (2001).

[7] Specific laws dealing with the protection of nature resources were also enacted: The Forest Law (1998) and the Grassland Law (2002).

The provisions of the Penal Code expressly provide environmental crimes and specific penalties, while the subsidiary environmental criminal law has different forms, whereby they often refer to the provisions of the Penal Code.

Beside imprisonment or criminal detention provided by Penal Code, we find also a comprehensive set of administrative sanctions in the environmental field.

Administrative sanctions are usually found in various administrative environmental laws, usually under the chapter referred to as legal liability, and specific rules for their application can be found in the Measures on Administrative Sanctions against Environmental Offenses, adopted by the Ministry of Environmental Protection.

2.1. Considerations on the legislation.

The Environmental Law in China historically developed around two focal points, from one side to protect the environment, and from the other side to maintain high rates of economic growth.

Seen the global nature of the environmental problem, the Chinese government was not the only one interested in ruling the field. Therefore, it was also engaged in the improving of its image that would follow the adoption of significant steps in the matter.[8]

Western countries were reassured by the adoption of clear and tight laws in the environmental field, and so the Chinese government pleased them with a comprehensive set of rules and with the adoption in 1994 of a public agenda (Agenda 21) regarding environmental matters.

However, when it came to the enforcing of the strict rules adopted, the balance between the two seen focus swayed toward the economic growth, with Chinese authorities that opted for a soft regime of controls, especially towards the many state owned enterprises that polluted the country.

We should also bear in mind that most of the monitoring activity was delegated to local administrative levels, the same that were granted a reward if the economic growth in their administration was above average.

The result was that the enforcement of the environmental law was selective, with an upstream political evaluation of the case to pursue, and a downstream accurate promotion of the exemplary punishment imposed to the selected violator.[9]

The two directives for the enhancement of environmental protection in China, according to the scholars that have studied the 1989 EPL, were from one side its serious enforcement, and from the other side the revision of the same EPL, the fundamental law in the field.

In recent years, the Chinese legislator has gone in both these two directions, with a renewed EPL, and with a more efficient enforcement of its provisions.

The most important sign in this way is perhaps the introduction of the so-called public interest litigation and the promising number of cases promoted by environmental protection social organizations in the first months of 2015. With this new institution, the Chinese government finally abdicated the exclusivity of its control over environmental issues, finally opting for a widespread policing in the field.

[8] As it has happened when China ratified the Kyoto Protocol (although it does not impose binding targets to China because it is still considered a developing country by the rules of the treaty).

[9] Castellucci I. (2009) *Le grandi tradizioni giuridiche dell'Asia*, UNI Service, Trento.

3. Environmental Courts in China

Another relevant instrument of Environmental control in China is the so-called Environmental Courts, introduced first in 1989 in order to guarantee that environmental cases would have been treated with the exact expertise.[10]

Then we had to wait until 2007 to see the environmental courts officially established and entrusted of Chinese environmental protection cases.[11]

The environmental courts have generally taken the form of environmental divisions within Intermediate People's Courts, but could form separate tribunals at the basic court level.

There are eleven environmental courts in force in China: two in Guizhou Province, one in Jiangsu Province, and eight in Yunnan Province.

These environmental courts are entrusted of all environmental cases, whether civil, administrative or criminal. Although a separate enforcement division has traditionally handled enforcement of judgments, some of the environmental courts have also incorporated enforcement authority as well.

The establishment of the environmental courts sometimes followed the outbreak of major local environmental pollution incidents.[12]

The caseloads of the environmental courts differ greatly in number and type.[13] Environmental courts have a number of potential benefits: promotion of greater consistency in the application of the law, improved proficiency of environmental judges, increased societal and government awareness of environmental protection, greater deterrence against environmental violations, and heightened enforcement.

Despite these positive sides, many observers have claimed that the lack of experienced judges could compromise, at least at the beginning, the potential benefit of these courts.[14]

With the reform of EPL that took place in 2015, environmental courts were granted of the improvement of the environmental enforcement. Weak enforcement in the environmental field is in fact still a problem in China and these qualified judges are one of the attempts to resolve these issues put in place by the Chinese legislator.

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[10] In 1989, the People's Court in Qiaokou District of Wuhan attempted to establish an environmental court, but the Supreme People's Court (SPC) voided the attempt in an official response. *See* [Report about Establishing an Environmental Court by the People's Court of Qiaokou District in Wuhan City] (Sup. People's Ct, effective Feb. 10, 1989) 1989 FAJINGHAN 19 (P.R.C.).

[11] This does not include environmental panels (*huanbao heyiting*) and environmental *xunhui* courts, which generally involve judges being assigned to work onsite at agency offices, including environmental protection bureaus (EPB's), land bureaus, and water bureaus (*huanbao xunhui fating*).

[12] For example, the two environmental courts in Guizhou Province were established in 2007 to address serious environmental pollution in Hongfeng Lake, Baihua Lake, and Aha Reservoir, the main sources of drinking water for the 3.9 million people of Guiyang Municipality.

[13] The Guiyang courts and the Wuxi environmental court are noteworthy for having accepted several public interest litigation cases including the Guiyang Two Lakes and One Reservoir Management Bureau v. Guizhou Tianfeng Chemical Ltd. decided in late 2007.
Seventy percent of the cases handled by the Guiyang environmental courts have been criminal cases. On the other hand, ninety-five percent of the cases handled by the Wuxi Environmental Court have been non-litigation administrative enforcement cases, pursuant to Article 66 of China's Administrative Litigation Law. The Kunming Court handled a mixture of criminal, civil and administrative cases.

[14] Source: https://www.chinadialogue.net/article/show/single/en/7972-Growing-pains-for-China-s-new-environmental-courts, last visited April 2016.

4. The Reform of 2015 - 中华人民共和国环境保护法[15]

Almost 25 years after the reform of 1989, in 2014 the Environmental Law changed again.[16]

On April 24, 2014, the Standing Committee of the National People's Congress enacted a new version of the Environment Protection Law, extensively modified.

The new law, whose articles increased from 47 to 70, come into force on January 1, 2015 and represents an attempt to remedy the lack of effectiveness of its previous version.[17]

For sure, the message of this reform is that now in China the business cost of causing environmental pollution is severely increased.

The EPL requires enterprises to reduce the generation of pollutants by giving priority to clean energy resources, adopting processes and equipment to increase resource utilization and minimize emission of pollutants, and adopting technologies to handle waste and treat pollutants (according to Article 40 of the EPL).

The law imposes also to adopt an environmental protection accountability system (according to Article 42 of the EPL), to pay environmental discharge fees (or be subject to an environmental protection tax) for pollutant discharge (according to Article 43 of the EPL) and solicit public opinion for construction projects (according to Article 56 of the EPL).

4.1. The most relevant innovations.

The first significant innovation that we can find in the renewed EPL is the increase of penalties and liabilities and above all their imposition on a daily basis.[18] These provisions are set to discourage delays in compliance.

Regarding to this aspect, the precedent EPL provided only a one-time penalty for each illegal activity, a rule that made the control system rather ineffective.[19]

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[15] Retrieved on http://www.gov.cn/zhengce/2014-04/25/content_2666434.htm, last visited April 2016.

[16] In between, over the years, China has ratified about 30 laws, 90 administrative regulations and many environmental standards in this field.

[17] According to Article 1 of the 2014 EPL: "This Law is formulated for the purpose of protecting and improving environment, preventing and controlling pollution and other public hazards, safeguarding public health, promoting ecological civilization improvement and facilitating sustainable economic and social sustainable development."

[18] Article 59 states: "Where an enterprise, public institution or other producer or business operator is fined due to illegal discharge of pollutants, and is ordered to make correction, if the said entity refuses to make correction, the administrative organ that makes the punishment decision pursuant to the law may impose the fine thereon consecutively on a daily basis according to the original amount of the fine, starting from the second day of the date of ordered correction. The fine prescribed in the preceding paragraph shall, pursuant to relevant laws and regulations, be enforced in accordance with considerations of operating cost of pollution prevention and control facilities, direct loss or illegal gains caused by such violations. Local regulations, based on actual demand of environmental protection, may extend the coverage of types of violation activities to be subject to the daily-based fine as stipulated in the first paragraph"

[19] Guoqiang Chen (2014) Opinion: Get Ready for New Environment Laws, China Law and practice http://www.chinalawandpractice.com/sites/clp/2014/04/25/opinion-get-ready-for-new-environment-laws/, last visited April 2016.

Another pivotal aspect of the reform is the clear regulation of public interest litigation. The new law has precisely a specific rule on public interest litigation against polluting activities.[20]

After the new EPL, at the beginning of 2015, the Supreme People's Court promulgated the Interpretation on Several Issued Regarding the Application of Law in Public Interest Environmental Civil Litigation (the "SPC Interpretation") introduced and regulated by Article 58 of the new EPL.

With its interpretation, the Supreme Court has expanded the definition of the "social organizations" that are entitled to file a public interest litigation and provided guidelines on the burden of proof regarding these case litigations.[21]

Already in the first three months since its introduction, public interest litigations were initiated several times by environmental protection social organizations.[22]

Experts forecast a further increment of these environmental public interest organization lawsuits, because this instrument grants a widespread audit on environmental practices, hindered until 2015.

This new law has also tried to increase transparency of both authorities and enterprises.[23] These new rules are important because before, data on soil pollution were classified as a state secret.[24]

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[20] According to Article 58: "For activities that cause environmental pollution, ecological damage and public interest harm, social organizations (NGO) that meet the following conditions may file litigation to the people's courts:1. Have their registration at the civil affair departments of people's governments at or above municipal level with sub-districts in accordance with the law, 2. Specialize in environmental protection public interest activities for five consecutive years or more, and have no law violation records. Courts shall accept the litigations filed by social organizations that meet the above criteria. The social organizations that file the litigation shall not seek economic benefits from the litigation."

[21] Michael W. Vella, Lillian He (2016), China Begins Enforcing Newly Amended Environmental Protection Law, Jones Day http://www.jonesday.com/files/Publication/1d201d08-ddef-4bc9-b017-f04ec8821f0f/Presentation/PublicationAttachment/9bd6ed7d-86fa-4ce9-b12d-f66f150fcacd/China_Begins_Enforcing.pdf, last visited April 2016.

[22] The FON and Fujian Green Home, jointly filed a lawsuit against four mine operators, claiming their unauthorized stone-quarry activities were responsible for ecological damage in Nanping city, Fujian province. The Nanping Intermediate People's Court accepted the case on January 1, 2015, the day the revised EPL took effect, making it the first environmental public interest litigation in China. Nine months later, in October 2015, the court issued its judgment in the case, ordering the defendants to pay both the clean-up costs at the site and the legal costs of the two social organizations.

On March 19, 2015, the ACEF, another social organization, filed an environmental lawsuit against Dezhou Jinghua, a Shandong chemical company, alleging the company had illegally discharged harmful substances. The lawsuit seeks RMB 30 million (US$4.8 million) in compensation. The Intermediate People's Court in Dezhou city of Shandong province agreed to hear the lawsuit.

Source: *Ibidem*.

[23] According to Articles 53 e 54: "enterprises and local government authorities will be required to make public environmental information and information on environmental quality, environmental monitoring, environmental incidents, administrative licensing and penalties relating to the environment, and the collection and use of pollutant discharge fees."

According to Article 55: "for enterprises that are heavy polluters, there is a requirement to publicly disclose the names of the principal pollutants discharged the method of discharge, the discharge concentration and total amount, information on discharge, which exceed standards, and information on the construction and operation of pollution control facilities."

According to Article 56: "any enterprise preparing environmental impact assessment (EIA) documents required for all construction projects must publicly disclose such documents and solicit public opinion largely than required under existing laws, and the government-approved EIA documents must be publicly disclosed.".

[24] Source: http://news.xinhuanet.com/fortune/2014-03/04/c_126216260.htm, last visited April 2016.

Finally, the revised EPL has introduced a specific provision about the so-called whistle-blower, granting protection to whoever reports environmental pollution or the failure of its control by the authorities.[25]

4.2. Conclusions.

The real problem of the EPL in China has always been its enforcement.

The latest revision of the EPL does not exempt this criticism, risking an inconsistent and biased enforcement of the law, especially on a local level.

Environmental protection in China has to be addressed locally, and the truth is that its management from a central government level is very difficult.

Another suitable measure would be the reform of the seen complementary law in the environmental field, such as the Law on the Prevention and Treatment of Air Pollution[26] and the Law on the Prevention and Treatment of Water Pollution.[27]

Some efforts in this regard have been made by the government, with the "Soil Pollution Prevention and Remediation Action Plan" issued in 2014.[28]

In conclusion, despite these new laws demonstrate how the debate on the environment in China is beginning to be more serious than in the past, it is necessary to understand if these commitments will remain only on paper.[29]

Either way, even if it is too early for a definitive assessment, the fact that two months after the EPL came into effect 107 cases lead to administrative detention and 15 cases to continuous daily penalties, have turned on the hopes of international observers.[30]

5. Pesticide law and Regulations in China.

Pesticide is one of the most used methods to intensify agricultural production in current global agricultural development.[31]

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[25] Article 57 of the 2014 EPL, that states: "any citizen, legal person or other organization will have the right to report: (i) Environmental pollution or ecological damage caused by any institution or individual; and (ii) failure of any environmental regulatory body to perform its legal duties, and such report must keep the relevant information on the informant confidential."

[26] Source: http://www.chinalaw.gov.cn/article/cazjgg/201409/20140900396925.shtml, last visited April 2016.

[27] Source: http://chinawaterrisk.org/resources/analysis-reviews/pollution-prevention-whats-the-plan/, Last visited April 2016.

[28] Source: http://chinawaterrisk.org/notices/new-soil-pollution-standards/, last visited April 2016. Govern top priorities are "improving rural environment and maintaining food security". Both are linked with soil pollution. This plan introduces five key tasks: "1) to give priority to protect arable lands, 2) pollution sources control, 3) risk management of contaminated sites, 4) pilot sites for soil remediation, and 5) to strengthen monitoring and management of the soil environment."

[29] Hogan Lowells (2014), Clearing the Air on China's New Environmental Protection Law, Hogan Lowells, U.S. http://www.hoganlovells.com/en/publications/clearing-the-air-on-chinas-new-environmental-protection-law, last visited April 2016.

[30] Michael W. Vella, Lillian He (2016), China Begins Enforcing Newly Amended Environmental Protection Law, Jones Day http://www.jonesday.com/files/Publication/1d201d08-ddef-4bc9-b017-f04ec8821f0f/Presentation/PublicationAttachment/9bd6ed7d-86fa-4ce9-b12d-f66f150fcacd/China_Begins_Enforcing.pdf, last visited April 2016.

[31] The Food and Agriculture Organization (FAO) has defined pesticide as: "any substance or mixture of substances intended for preventing, destroying, or controlling any pest, including vectors of human or animal disease, unwanted species of plants or animals, causing harm during or otherwise interfering with the production, processing, storage, transport, or marketing of food, agricultural commodities, wood and

The World Health Organization (WHO) offers a guideline [32] regarding pesticide classification, which distinguishes between more and less hazardous forms of each pesticide, based on the toxicity of the technical compound and on its formulations.[33]

Pesticide production breaks down mainly into three, namely pesticide intermediates (used in chemical reactions), API synthesis ("Active Pharmaceutical Ingredient") and preparation process (the process of manufacturing a pesticide).[34]

China is one of the biggest countries in the world, with a large population, complicate climate and a varied geographic environment.

Agriculture is an important economic sector in the country, counting 300 million farmers, primarily producing rice, wheat, potatoes, sorghum, peanuts, tea, millet, cotton, barley, oilseed, pork, and fish.

The Chinese pesticide production industry began in 1950 with the DDT production at Luzhong in Sichuan province.

Over the following years, agriculture output has quickly increased thanks to agricultural reform and technological innovations.

During the 90's, China's agriculture entered a new stage of development, and the use, management and control of pesticide were highlighted.

After nearly 50 years of development, China became the largest producer of pesticide in the world. The country can manufacture more than 300 technical pesticides and 3000 pesticide formulations. In 2015, China produced 1.75 million tons of herbicides, 530 Kilotons of insecticides and 180 Kilotons of fungicides.[35]

wood products or animal feedstuffs, or substances that may be administered to animals for the control of insects, arachnids, or other pests in or on their bodies. The term includes substances intended for use as a plant growth regulator, defoliant, desiccant, or agent for thinning fruit or preventing the premature fall of fruit. Also used as substances applied to crops either before or after harvest to protect the commodity from deterioration during storage and transport" Source: http://www.fao.org/home/en/, last visited April 2016.

[32] This guideline takes into consideration also the pesticides labels. Labels should be uniform in the statement on the nature of the risk of the product. They should bear a symbol indicating a high degree of hazard and a signal word or phrase (poison or toxic). The presentation of the symbol and word or phrase, in terms of color, size and shape should be sufficient prominence on the label.

Source: http://www.who.int/ipcs/publications/pesticides_hazard_2009.pdf, last visited April 2016.

[33] The WHO guidelines classifies pesticides in the following classes: Extremely Hazardous (Class Ia) active ingredients (technical grade) of pesticides, Highly Hazardous (Class Ib) active ingredients (technical grade) of pesticides, Moderately Hazardous (Class II) active ingredients (technical grade) of pesticides, Slightly Hazardous (Class III) active ingredients (technical grade) of pesticides and, finally, active ingredients unlikely to present acute hazard in normal use.

Source: http://www.who.int/ipcs/publications/pesticides_hazard/en/, last visited April 2016.

[34] Source: https://croplife.org/wp-content/uploads/2015/04/Effective-Management-of-Highly-Hazardous-Pesticides-April-2015.pdf, last visited April 2016.

[35] Fen Jin, Jing Wang, Hua Shao and Maojun Jin (2010), Pesticide use and residue control in China, in *Journal of Pesticide Science*, 35(2010): 138-142. To understand the business size, in 2006-2014, China's output of pesticide API grew of 14,2% and in 2015 the output reach approximately 3,66 million tons. China's pesticide API production is mainly concentrated in Jiangsu, Shandong, Henan and Zhejiang, which contributed in 2015 nearly 70% to the total output. Other data covering the years 2006-2014 say that the proportion of herbicides in Chinese pesticide preparations raised steeply, while the portion of insecticides kept declining, and the share of fungicides remained unchanged.

Source: http://www.marketresearch.com/Research-in-China-v3266/China-Pesticide-9400388/, last visited April 2016.

Whereas China is a big pesticide producer and consumer, on the other side, it is also an influential exporter, since the export price of pesticides in the country is far lower than the import price.[36]

The Chinese control in the field began with hesitant regulation, for example the DDT, banned for their persistence in developed countries since the 1980s, were prohibited in China only in 2009.

However, the Chinese legislation in the field has been coordinated since 2007, and perfected successively.[37]

China owns its agricultural chemical registration system. The Ministry of Agriculture is involved in pesticide registration and market supervision, while the Ministry of Industry and Information Technology authorizes the pesticide manufacturing companies and the Ministry of Environmental Protection studies the environmental impact of pesticide manufacturers and controls pesticide residue in the environment.

Pesticide registration can be classified into field trial, temporary registration and full registration.[38]

In China all pesticide-manufacturing companies (which still implements their own quality standards) are subject to production management and authorization by the Ministry of Industry and Information Technology.

To identify the product, pesticides have three numbers: pesticide registration certificate number[39], approval certificate of pesticide manufacturing[40] and the production license number.[41]

The pesticide field has been also covered by the Chinese Advertising Law (enacted on 1st September, 2015).[42]

The new Advertising Law, which wants to "standardize advertising activities, protect the lawful rights and interests of consumers, facilitate the healthy development of advertising sector and maintain social and economic order", includes in fact in its regulations also the pesticides.

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[36] Here some data: in 2010-2014, China's pesticide export volume grew of 17,3% and in 2015 the volume was 1,3 million tons. Source: Fen Jin, Jing Wang, Hua Shao and Maojun Jin (2010), Pesticide use and residue control in China, in *Journal of Pesticide Science,* 35(2010): 138-142.

[37] The most relevant National Laws effective in the field are the Water Pollution Prevention and Control Law (2007) that regards pesticides, this law includes provisions to strengthen pesticide management to prevent water pollution and the Pesticide Management Law (2013). The Ministerial and Administrative regulation are as follows: Measures for the Administration of Pesticide Labels and Manuals (2007), "农药标签和说明书管理办法"; Measures for Implementing the Regulation on Pesticide Administration (2007), "农药管理条例实施办法"; Data Requirements of the Pesticide Registration (2007), "农药登记资料要求". A significant Local regulation to name is the Administrative Regulation of Quality and Safety of Agricultural Products in Hunan Province.

[38] The field trial happens when the substance is undergone a preliminary control under the competent authority of agriculture at a provincial level according the pesticide field trial efficacy test guidelines. After this, a temporary registration may be necessary in the case of use under special circumstances. The competent authority of agriculture at provincial level examines the pesticide, and then it should be filed to the Ministry of Agriculture – Expert Committee for Pesticide Temporary Registration for a review. If it is fine, a temporary registration will be issued. To have a full registration is necessary the approval of Health, Environmental protection, Industry Ministries.

[39] Source: http://202.127.42.135/a1.aspx last visited April 2016.

[40] Source: http://www.aqsiq.gov.cn/search/gyxkz/, last visited April 2016.

[41] Source: http://gzly.miit.gov.cn:8080/datainfo/miit/nycpscpzzsmd.jsp, last visited April 2016.

[42] Source: http://www.wipo.int/edocs/lexdocs/laws/en/cn/cn393en.pdf, last visited April 2016.

Adverting should be truthful and lawful and should not contain false or misleading content, or cheat or mislead consumers.[43]

5.1. Pesticides and their relationship with Chinese environmental problem.

Two relevant issues involve pesticides, environmental consequences and human health harm.

There are many scientific studies around the world, which demonstrate the high level of danger of the pesticides and, thanks to the developing ecological awareness, there is a growing worldwide concern about the environmental and human health risks of pesticides.[44]

However, it is impossible to forget the advantages connected with the use of pesticides and fertilizers. The most important of them is the economic benefit, derived from the protection of agricultural output and quality in complicate climate areas, and the reduction of other costly inputs, such as labour and fuel. Other benefits include the maintenance of aesthetic quality and the protection of other organisms.

The issue is complex and trying to find a compromise or alternatives seems sometimes hard especially for China.[45]

The problem here is that this country must feed its population with limited agricultural resources and, thanks to pesticides, farming industry has grown a lot during the last 11 years.

Unfortunately, this achievement caused serious environmental costs, now undeniable.

Sure enough, pesticides have done too much damage to China's ecosystem and, according to Xinhuanet (China's main state news agency), their use should be upper limited from 2020.[46]

For example, the north-eastern province of Heilongjiang, which produces one tenth of China's grain, has encountered huge problems, as soil acidification, soil hardening and reducing yields.[47]

According to a study of the Ministry of Agriculture (MOA – 农业部) at least 16% of China soil contains more pollutants than national standards allow, less than one third of fertilizers and pesticides are absorbed by crops, less than two thirds of plastic film are

[43] According to article 8: "Advertising should be accurate, clear and easy to understand when describing commodity performance, function, or usage, quality, ingredients/components, price, manufacturer, valid period and guarantee, among others, or service items, provider, format, quality, price and guarantee, among others, if any." In case any content in the advertising requires administrative permission, article 11 says that: "such content should match the permission". In addition, where the advertising mentions patented product or method: "the patent number and type should be noted" (Article 12). Finally, article 21 is the one related to pesticides and states: "The following content is not allowed in advertising for pesticide, veterinary drug, and feed and feed additives: 1) Assertion or guarantee for efficacy and safety; 2) Using the name or image of scientific research, academic, technology promotion organization, industry association, professional or user; 3) Indication of rate of efficacy; 4) Text, language or picture that violates safe usage procedures; 5) Other content prohibited by laws and regulations."

[44] According to many studies they can cause birth defects, sterility, and cancer, damage to the immune system, and adverse ecological effects, for instance contaminated groundwater, salinization, desertification, erosion and radioactive pollution. Source: http://www.unep.org/chemicalsandwaste/Portals/9/Pesticides/MeetingPesticidesRisks/EnviroFactorsBrnstrmingMeeting%201-3July09%20-%20FAO.pdf , last visited April 2016.

[45] See: https://www.wilsoncenter.org/sites/default/files/pesticides_feb28.pdf, last visited April 2016.

[46] See: http://news.xinhuanet.com/english/2015-07/24/c_134444571.htm, last visited April 2016.

[47] Li Zijun. (2006). "Soil Quality Deteriorating in China, Threatening Public Health and Ecosystems." Retrieved at http://www.worldwatch.org/node/4419, last visited April 2016.

recycled, less than half of livestock and poultry waste is processed, and straw burning is still widespread.[48]

MOA is worried also about desertification, water resources, industrial contamination and maintaining arable land.

According to the Chinese Academy of Agricultural Science (CAAS), half of 800 points in 20 counties in five Northern provinces had excessive levels of nitrates in ground water attributable to fertiliser. In 2015, all central and south-eastern provinces bar Jiangxi and Shanxi suffered groundwater nitrate pollution.

These problems are not limited only into the farmlands. There are houses and apartments built on former chemical plant sites.[49]

In 2004, in Beijing, three workers were poisoned by toxic gas from an old pesticide plant side while they were building a house.[50]

In 2014 things seems changing with a rising political awareness[51] and a stricter standard on pesticide residue for farm produce in China enacted in the same year.[52]

Compared with the standard that took effect in 2012, the new standard contains 1.357 new indices regarding 65 new pesticides and 43 new types of food, covering vegetables, fruits, grain, edible oil, sugar, soft drinks, nuts, eggs and meat. It also includes juice and preserved fruits. Some of the new indices have international references set by the Codex Alimentarius Commission[53], and some other match or exceed the strictness of the international standards.

On 2015, the State Council has announced plans to improve green farmland and increase irrigation, according to these plans, agriculture must use less water and treatment, improving new technologies to better efficiency. In the same year, the Ministry of Agriculture released a plan for sustainable agricultural development over the next 15 years and on 8 October 2015, the Ministry of Agriculture released two guidelines on pesticide residues in food: "Guideline on the Risk Assessment of Pesticide Residues in Food" and "Guideline on the Development of Maximum Residue Limits in Food".[54]

The target by 2030 is to use resources more efficiently and frugally.

There are also some notable sustainable experiments. For example, a rice company in Heilongjiang, instead of using fertilizer and pesticides, uses ducks. These animals eat weeds and pests, stimulate the growth of rice swimming. The ducks' droppings are also an organic fertilizer.

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[48] Huizhen Li, Eddy Y. Zeng, Jing You (2014), Mitigating Pesticide Pollution in China Requires Law Enforcement, Farmer Training, and Technological Innovation, in *Environmental Toxicology and Chemistry*, 33(2014): 963-971.

[49] An example is a housing project in Wuhan, in Hubei province where there are tons of contaminated soil beneath the houses with toxic heavy metal from steel, iron and smelting plants, persistent organic pollutants from pesticide residue, organic chemical compounds and electronic waste.

[50] Source: http://english.cas.cn/newsroom/china_research/201103/t20110311_66224.shtml, last visited April 2016. Usually the remedy for this problem is to remove the polluted soil and replace it with clean soil, but the cost is very high.

[51] See: http://www.chinapesticide.gov.cn/zwxw/2793.jhtml, last visited April 2016. Where the Government underlines that the efficient use of fertilizer/pesticide helps to reduce pesticide residues.

[52] This standard was jointly issued by the Ministry of Agriculture and the National Health and Family Planning Commission and includes 3.650 indices detailing the maximum allowable residue for 387 pesticides on 284 types of food. Source:
http://news.xinhuanet.com/english/china/2014-07/31/c_133523153.htm, last visited April 2016.

[53] A supranational commission established by the Food and Agriculture Organization of the United Nations and the World Health Organization, set to develop harmonised international food standards.

[54] See: https://food.chemlinked.com/news/food-news/china-moa-releases-two-food-pesticide-residue-guidelines, last visited April 2016.

6. Considerations and future perspectives.

The pictured scenario, even if it is not rosy, allows for a certain amount of optimism.

Chinese government is taking steps in the right direction, as it appears to have realized that environmental concern is no longer an issue coming from outside the country, but is above all a problem for Chinese people.

Even if it is still too soon to understand how the renewed 2015 EPL will integrate with the environmental protection, legal and administrative system in China, we can see encouraging traits, such as the mentioned introduction of public interest litigation, whistleblower protections, daily-basis sanctions and the further implementation of Environmental Courts.

Another significant example in this direction is provided by the Pesticide law, a rather organic and complete legislation, stratified during the years, where the legislator is now focusing on specific and collateral provisions, polarizing its intervention towards the protection of Chinese consumers (a clear sign of that is the enactment of the law on advertising in 2015) and directly addressing and implementing recognized international standards in the field (such as the Codex Alimentarius).

Last but not least we should consider that a further tangible sign of this effort was the Chinese participation at the 2015 Paris conference, COP21. Whereas in other fields the interest of China in global approbation has decreased in recent years, in the Environmental sector China still wants to be present at a supranational level.

Despite some resistance of its delegates during the works of the conference,[55] China made important pledges on its transition from fossil fuel dependence towards a low-carbon economy.

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[55] Chinese delegates were in fact accused of resisting a measure widely seen as crucial for a successful accord, the requirement for countries to update the pledges they have made to limit their emissions every five years. Source: http://www.cnbc.com/2015/12/08/, last visited April 2016.

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THE EU COMMUNITY AGRICULTURAL POLICY ON FOOD SAFETY AND QUALITY OF FOOD CONSUMPTION

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Abstract

The last half-century of European agricultural history deserves to be filed as a slow and contradictory process of converting values of the area, or rather, the relationship between environmental resources, local traditional cultivation techniques and cultural food patterns. The Common Agricultural Policy (CAP), established by the Treaties of Rome in 1957, over a few decades has changed the face of European farmland. Firstly by adapting production facilities, cropping systems and agricultural landscapes in a pattern of sectoral development and production required by the laws of the market and the relationship between supply and demand of food products. Increasing production and unitary yields, price support and set-aside policies - then supporting with increasing conviction, the integrated territorial development and the preservation of cultivated resources, local cultural and environmental structural policies, incentivisation of multifunctional and sustainable agriculture, development and protection of quality produce marked - PDO, PGI, TSG, BIO - all leading to the introduction of the "single farm payment". The concern of ensuring food security for the whole population of the Union, in the evolution of the CAP, was then soon overcome by the desire to protect the food quality of typical local products. The different objectives that characterize the directives of the CAP are, especially in recent years, contradictory and have caused unresolved problems, which have been aggravated by the recent global economic crisis. Along with the food loss and waste, also no-food crops have increased and the number of people with difficulty accessing food has dramatically risen, as confirmed by some quantitative analysis of hunger in Europe. The authors critically examine history and programming of the CAP in light of the new incentives 2014-2020 and outcomes that could ensure both food safety and the quality of food consumption.

1. Contradictions, potentials and apories of the Community Agricultural Policy (CAP)

In the current phase of rethinking and redefining the commitments and ideals that led to the creation of the European Union, the Community Agricultural Policy (CAP), which plays a leading role, is today called to combine multifunctionality of the primary sector with the instances of environmental, food and sociocultural sustainability. The latest reform (2014-2020) in the illusion of greening and food security has in fact ended up aggravating the oppression between family farming and agro-industrial systems: the first hold in their possession the models and cultivation techniques that guarantee food quality and typicality; the second is readily responsive to the question of bioenergy sources that boost no food crops.

The history of the first sixty years of the CAP clearly highlights the inhomogeneous and contradictory attribution of support to the different types of productive units and local realities (see par.2), a general wide spread discontentment due to the lack of attention to waste and production surpluses (see par.3). Delivered incentives have been too often

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engulfed by agro-industrial systems in North-Atlantic Europe in spite of the long-standing will to support family businesses and lagging regions in the Mediterranean countries.

The re-reading of the various evolutionary phases, the impact that the European Community directives have had on the extraordinary evolution of local agricultural systems and the analysis of waste, paradoxically accompanied by the increase in poverty and malnutrition in a growing number of European citizens, allow to stigmatize many mistakes made in the past to support the primary agri-food sector, as well as to propose future incentives more coherent with the goals that they intend to pursue.

Residential agriculture and quality productions should be rewarded rather than expect small family farms to meet the demand for biodiesel and biomethane, which can be better met by larger-scale enterprises, which are today often responsible for the cultivation of farmland in developing countries

2. The contradictory evolution of the CAP between high-quality food production and ecologist flamboyance

Together with the European Economic Community (EEC) and the European Atomic Energy Community (EAEC), March 25, 1957, with the signing in the Capitol of the Treaties of Rome, originates the Common Agricultural Policy (Articles 38-47 of the EEC Treaty), to which the six founding Member States (Belgium, France, Germany, Italy, Luxembourg and the Netherlands) assigned not only economical goals but also social and political tasks. A key role was given to the primary sector in the development policies and community cohesion and we are looking to it to ensure a fair standard of living for farmers; to stabilize the markets and prices for the benefit of farmers and to ensure food security and reasonable prices of agricultural products to consumers.

The European Common Agricultural Policy (CAP) aims to achieve these targets through incentives to increase agricultural productivity through technical progress and competitiveness of companies. This is an agricultural policy model aimed at growth with productivity, based on the amount and profitability of the results obtained, from which the CAP in its first half century of life, however, gradually moved away to support multifunctional agriculture enhancement of quality: this model is also protagonist of sustainable and integrated projects of territorial development and it is able to involve other economic sectors (artisanship, tourism, commerce, services) and all aspects of social reality (values, traditions, ethics, aesthetics).

The transition of the CAP from the sectorial development model to the territorial development model can be summarized into at least six programmatic phases: 1) promoting increased production and crop yield (Sixties); 2) supporting pricing policy and start of structural policies (the Seventies/Eighties); 3) Set-aside policy and reinforcement of structural funds for the integrated development of the territory (PIM - Mediterranean integrated plans; LEADER Programs 1991-199 and LEADER II 1994-1999 - *Liaisons entre actions de développement de l'économie rural* - and Rural Development Plans) (Nineties) 4) Integrated territorial development policies and multifunctional and sustainable agriculture enhancement (LEADER + program Reform *Agenda 2000*); 5) Regionalization of support interventions and introduction of the "single farm payment scheme", free from production activity and subject to the adoption of "virtuous" agricultural practices, environmentally friendly, respectful of farmers, consumers and cattle raised (Fischler Reform of June 2003); 6) reduction of direct incentives and support initiatives for greening and food safety (2014-2020 Reform).

The decades that separate the guidelines designed to ensure the supply of food from those aimed at food quality protection, have grown surplus production and environmental pollution, along with the number of Member States more than quadrupled[1], phenomena that the CAP initially tried to restrain with the price support policy, soon became unsustainable and the set-aside policy. In the nineties of the last century, however, the same results of the CAP sectoral model led to a new awareness of farmers and consumers: it's necessary to focus on the amount of productivity, rather than the quality of food products.

In the third millennium, the term 'food security' has taken on a double meaning of supply certainty and protection of food quality. Instances that are combined in one important goal: improving the population nourishment and ensuring the availability for future generations. Now it is accepted that feeding ourselves in a healthy and balanced way equates to protecting natural resources from erosion of exploitation. New phenomena of malnutrition and food poverty are increasingly evident and outrageously present in rich European countries, where excess and wastage of food products accompany without counteracting the increasing number of hungry people (cf. par. 3).

All quality food production is the result of the commitment and wisdom of the farmers who have been able to increase the value of the peculiarities of their rural areas, tying in consumption to the seasonality of products and collective rites of farming actions. The protection of this heritage of manufacturing experiences, processing and methods of consumption of local products are some of the goals which the European Union set, ahead of all other organizations and countries in the world, in order to establish a suitable legislative apparatus that would guarantee them and that today is also demanded from non-European countries to protect their productions.

Already since the last decade of the twentieth century among the EC legislation measures, the territorial dimension of development has been launched to promote those labels concerning the attribution of quality for agricultural and food products of excellence achieved in respect to accurate regulations Production[2]. They are identifier documents of each product-deposited upon submission of the request for attribution of trademark protection: *Protected Designation of Origin* (PDO), *Protected Geographical Indication* (PGI), *Traditional Speciality Guaranteed* (TSG) and *Products of Organic Farming* (BIO) [3].

[1] Currently there are 28 EU Member States (Austria, Belgium, Bulgaria, Croatia, Cyprus, Denmark, Estonia, Finland, France, Germany, Greece, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, United Kingdom, Czech Republic, Romania, Slovakia, Slovenia, Spain, Sweden, Hungary).

[2] The production regulations for the protection of European trademarks has to state: the name and the type of product; the boundaries of its geographical distribution area of reference; the elements that attest to its link with the geographical environment of origin; the detailed and full description of technical and production phases; the codes of the reference standards, which must be clearly legible on the label; monitoring organizations officially recognized at European level which will address the periodic checks in companies. The product specification is deposited and can be changed only after the granting of the trademark, for example, to expand the production area, established within limits that later may be too restrictive (PDO, PGI), or to make changes to the phases of production as a result of new advances in technology (STG).

[3]The Protected Designation of Origin (PDO) is granted to products for which all stages of "production, processing and preparation" take place "in a specific geographical area and are characterized by a recognized and established expertise"; Protected Geographical Indication (PGI) is attributed to the productions in which the link with a specific geographical area is at least in a phase of realization: The Traditional Speciality Guaranteed (TSG) is independent of geographic location and only guarantees the traditional production method; organic farming (BIO) embraces the totality of environmental technological

New concerns and new demands have thus brought the CAP to transit from the food supply to the protection of quality products[4]. The purposes that the rules of the primary sector in fact intend to pursue through the attribution of quality labels are: 1) support for diversification (biodiversity and food crafts) and to local development; 2) fight against food fraud which is becoming more easily recognizable; 3) consumer education towards conscious and adequate nutrition. PDO, PGI, TSG and BIO are therefore given to combat imitations of quality food production, only production related to the various environmental and/or local traditions.

The territorial features of each certified product are enhanced and protected, and consumers not only benefit by being geared towards quality choices, they are also protected from food mystifications which can often be dangerous to our health. The achievement of the quality trademark EU, in fact, engages the manufacturer, through the Regulations, to ensure strict compliance with rules of production and to accept, by supporting the cost, the checks required by the Monitoring Organization in charge of inspections. Overall there are 1,033 food production brands, of which 515 DOP, IGP 476 and 40 STG, Italy with as many as 230 products among PDO, PGI and TSG is in first place in the production and quality productions certified registration; France, Spain, Portugal and Greece follow respectively with 184, 150, 116 and 90 accredited products in the same period running from 21 June 1996 to 30 June 2011[5].

The interpretation of the Italian record is even taken for granted: our country has an extremely diverse environment natural heritage, from a geological point of view, morphologically and concerning the climate, it has a variety of micro-environments that go with the equally extraordinary concentration of history, traditions and different local cultures, expressed in symbolic form and in food rituals.

Europe has therefore a normative primacy, compared to all other regions in the world, for the attention to the quality of the relation Food-Agriculture-Environment –

The EU member states also ratified the "European Convention landscape" expression of the fruitful relation between "culture and nature"[6] – our country is a leader in the

and managerial features of agricultural production because it requires that all agricultural practices are free of artificial agents, fertilizers and chemical pesticides.

[4] The safeguard of typical products of quality and enhancement of the specificities of food products are realized at first through EC Regulations n. 2081/92 and EC n.2082/922; later the new EC Regulation 509/2006 and Regulation (EC) No 834/2007 of June 2007 on organic production and labeling of organic products (abolishing Regulation (EEC) 2092/91), they have intervened to perfect them.

[5] Looking at the data of EU protected products the presence of registrations to trademarks PDO astoneshes, PGI and TSG by third countries, non-EU, a clear sign of EU legislative project leadership that will attract attention and accessions to planetary scale. Since 1992 the first regulations (Art.12 of Reg. (EEC) n. 2081/92 concerning (EEC PGI and PDO; Art.16 of Reg.) no. 2082/92 on STG) had hoped for reciprocity of guarantees, valid for quality production both from European countries and from outside Europe. The new regulations of 2006, reiterating the opening to the extra-Community dimension, grant however to Third Countries also the autonomy to indicate their national supervisory bodies, which means that the European Union is found to protect agricultural food production where it can't exercise checks or controls.

[6] Even compared to the rural landscape protection legislation, Italy and Europe have anticipated all other countries in the rest of the world. Opened for signature by member States in October 2000, the European Landscape Convention has recognized to the traditional techniques of exploitation of natural resources, economic and productive new features: the ability to save potential and production capacities for future generation; the force of attraction of tourist flows and active employment; the power to expand trade flows of quality production; in other words, they have recognized the rural landscape the role of driving force of local development.

rediscovery of the *genius loci* and in the preservation of rural landscape and local production and it protects food and agricultural with the national brand PAT[7].
Therefore, within the European Community, Italy has always urged reflection on the landscape and agri-environmental issues, so that rightly in January 2002 the city of Parma was chosen as headquarters of the European Food Safety Authority (EFSA), a politically independent organisation of all Union countries, with scientific consulting and information functions on different risks of the food chain[8].
The Nineties marked the emergence of ecological issues in agricultural policies of many countries in the world and in the CAP that the reform proposed by the Irishman MacSharry in 1992, known as the set-aside policy, redefines the same objectives. The over industrialized and competitive agriculture has now imposed, both in Western and socialist countries, the need to restore a healthier and more balanced relationship with the environment in order to protect biodiversity and quality of agro-food production. Prompted by opposing food production problems – overproduction and market saturation in Western countries and lack of basic nutritional elements in developing countries and in many countries of the socialist coalition (especially Cuba) – an extraordinary convergence of interests occurs, paradoxically supported by radically different ideological contexts (capitalist agriculture and collectivist agriculture), united by the desire to adopt agricultural practices that respect the environmental balance, to save non-renewable energy and get closer to the local food market demand. With the beginning of the third millennium the buzzwords within the European Union therefore become: regionalization of operations, enhancement of rural landscape and protection of quality food products.
The impact of the increasing agricultural production policy on the ground is far from painless for the natural environment and for the organization of rural areas. The belief that an economically vital business size should not be smaller than 20 hectares – minimum threshold indicated by the CAP rules for access to funds – without discouraging the rational use of the most modern soil cultivation tools and without causing its exit from commercial channels, has always conveyed the incentives on the large capitalist enterprise, rewarding the most appropriate annual monocultures, in spite of the use of fertilizers and mechanical tools, to cut down on expenses thanks to the increase in unit yield per hectare of cultivated land.
A productive pattern certainly more suited to the North Atlantic Europe farmland, than to those of the Mediterranean area where the prevailing less aggressive and specialist family farming, remained the prerogative of the middle and small production units.
The reform of the set-aside in 1992 was apparently based on principles of ecological feature and it was pressed for by the desire to respect the necessary natural environmental rhythms to replenish the agronomic properties of soils, its approval is in fact urgent and imperative to cut down on expenses, which have become unsustainable, absorbed by the price support of surplus products. It is therefore a dual interest, to reduce crops which are superior to market demand and balancing the environmental damage, to push European countries towards an agricultural policy that paradoxically encourages the "non-

[7] The mark is awarded by our Ministry of Agriculture and Forestry to be published every year in the Official Journal on an updated list of PAT products. The Ministerial Decree of 18 July 2000 defines Foodstuffs (PAT) all productions "whose methods of processing, storage and aging prove time-honored, homogeneous throughout the territory concerned, according to traditional rules for a period of not less than twenty-five years".

[8] The decision to set up a supranational authority for food protection was taken as a result of repeated food warnings in the late nineties.

production" and rewards companies that renounce cultivating the land, i.e. the so called fallow land. The reduction of arable land does not go along with the best care of the fields, but it is abandoned to fallow and the rewards for the withdrawal of land from cultivation are again swallowed by larger production units which have more surfaces to be used as meadow pasture. On the other hand, the medium and small companies are still penalized. They are the only ones that can ensure the defence of the territory and the preservation of both less aggressive and less ecocidal traditional farming techniques.

In the nineties, however, a new experimental phase of the CAP sought the direct involvement of local communities in the redevelopment and enhancement of environmental and cultural heritage of the territory in which they live. The breakthrough, achieved after the publication of the Green Paper "Perspectives of the Common Agricultural Policy", lead to approve the Community Regulation 1257 "Rural Development Plan" of 1999, which called for farmers "good behaviour", encouraging them to comply with environmental, landscape and cultural resources of their countryside. The regionalization of interventions, the support of multifunctionality of agriculture and greening policies, converge in the 2000 Agenda, which marked the final transition of the CAP from the sectional development pattern to the territorial development one (Program Leader I and Leader II, Leader program + and Fischler Reform spread by Regulations (EC) no. 1782/2003 and no. 1783/2003)[9].

The landing of the CAP to its most mature expression, that is, to a pattern of development closer to the territory and to the farm, coincides chronologically with the EU opening to 10 new member states, which joined it in May 1, 2004. Although it was preceded by the adjustment to a series of specific political and economic criteria (PHARE and SAPARD programs), and even if it was guaranteed by the adoption of the new member country of the *acquis communautaire*[10], the entry of new Member States stirred up in the farmers and in the local administrators – whose role as the leaders of development has already been recognized – many worries and legitimate concerns that the aids to farms might be reduced, both those aids already earmarked for market policies and those ones which support the rural development policies, especially in the marginal regions.

The latest CAP reform (2014-2020), in an attempt to reconcile greening and food security, had to face old and unresolved conflicts between family farming and agro-industrial systems, worsened by the new social and energy emergencies: bursting of migration flows and increasing demand for bioenergy. The conversion process to the territory and the quality of products, which had focused its efforts on the recovery of a crop and food wisdom able to get data from the environmental features and experiences stratified in local traditions, is thus put at risk by the demand that too many agricultural areas have for the annual extensive monocultures, which are responsible for the serious environmental damage (desertification and soil pollution), are now paradoxically financed to protect the environment by means of biomass grown for energy purposes (climate-energy package "20-20-20").

The demand for new agricultural policies, especially in Western countries, must therefore clarify some contradictory issues symbolically represented by the huge changes

[9] The new guidelines introduce the "single farm payment" and "decoupled support", that is no longer linked to the quantity of production and to the breadth of the farm, but it is connected to the land ownership and bound to ecofriendly farming practices (i.e: sustainable), quality and wholesomeness of production techniques (safety on work and animal welfare) and agricultural products (quality and safe food).

[10] That is, the *acquis communautaire*: institutional stability, democratic order, protection of human rights and cultural minorities; compliance with the obligations binding on all Member States and market laws.

to the Italian agricultural systems (fig.1) and by the alarming increase in people at risk of poverty and social exclusion (fig.4).

In our country, censuses conducted between the 2000 and 2010 show an accelerated evolution of regional agricultural systems with a sharp reduction of micro and small farms (from 0 to 2 ha.), going down from a total of 1.586.777 to 824.652 with a 44% decrease. Also due to this phenomenon, on the one hand a general decrease of TAA (Total Agricultural Area) up to 8% (17.081.099 ha. in 2010 compared to 18.766.895 in 2000), has been recorded and on the other hand an increase in the average soil available per farm from 7.8 to 10.6 ha. In some remarkable cases, as illustrated in the graphics depicting them, the provincial agricultural systems[11] overturned the supporting foundation of their economic productivity, shifting from medium to large-scale enterprises (fig. 1).

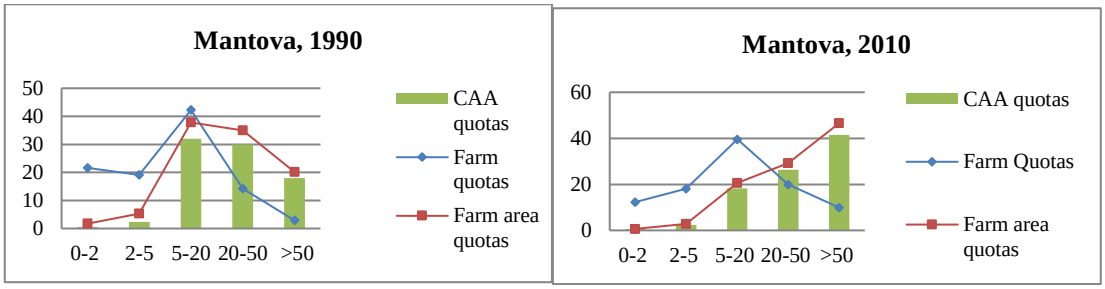

Fig. 1 – *The transformation of production from one type of enterprises to another in the agricultural system of Mantova (1990 and 2010)*. Source: ISTAT data, our elaboration

3. Europe of surpluses: from the price support policy to the scandal of food waste

The CAP already in its planning documents (The Treaty establishing the European Economic Community, 1957) posed among its objectives, in addition to the increase of productivity, the security of supply (art. 39), this in response to a food suffering condition exasperated by the war that had devastated Europe and the world.

To achieve these objectives a number of measures were established such as «the regulation of prices, aids for the production and marketing of the various products, systems for the constitution of stocks» (*Ibidem*, art. 40). They were created to guarantee the supply and, at the same time, favor the survival of farmers in difficulty, these actions led to the accumulation of «mountains of food» unsold and to the uncontrolled growth of production (tab.1).

The "butter mountains and wine lakes" generated a media response to which the Commission itself had to respond with an official document (European Community, 1980) declassifying, though, the questioned surpluses[12] into "untapped in best way resources", not recognizing the damage and at the same time minimizing the effects.

This document states "relatively light adjustments can affect significantly and durably on the production, while persistent shortcomings are likely to lead to a waste of resources far greater than that due to abundant availability". The foreword to the document ends by saying that "so many and so different were the meanings attributed to the term "surplus", that most of its positive aspects have been concealed". From these quotes it's very clear justification purpose of this document which didn't attempt to deal critically or try to solve the problem rather belittling it, continuing to favour "production growth at a pace

[11] The analysis of the agricultural systems was conducted according to the research method (registered SIAE n. 2007005663) by the university research team «GECOAGRI LANDITALY».

[12] With the world surplus, we mean food that while being safe on quality level is not purchased or consumed by those for whom it has been prepared. See Garrone et al., 2012.

that didn't always correspond to the market's absorption capacity"[13] (Commission of the European Communities, 1991).

	Cereals	Sugar crude value	Beef	Butter	Skimmed milk powder
World	1204,4	92,5	47,9	6,2	4,1
USA	267,1 (22,5%)	5,2 (5,6%)	11,3 (23,6%)	0,5 (8,1%)	0,4 (9,8%)
USSR	229,5 (19%)	9,4 (10,2%)	6,6 (13,8%)	1,4 (22,6%)	0,5 (7,3%)
EEC	116 (9,6%)	12,8 (13,8%)	6,4 (13,49%)	1,9 (30,6%)	2,2 (53,7%)
Canada	41,7 (3,5%)				0,1 (2,4%)
Brazil		7,9 (8,5%)			
Cuba		7,7 (8,3%)			
Argentina			3,2 (6,7%)		
Australia			2,1 (4,4%)		
India				0,6 (9,7%)	
New Zealand				0,2 (3,2%)	0,2 (4,9%)

Tab. 1 – *World production of major agricultural products in 1978 in millions of tons*. Source: European Community, 1980.

The imbalances between consumption and production persisted in the 90s so that the same EEC stated in 1991, "the basic problem due to the growth of surpluses, had not been resolved". In 1992, the structural reform of the CAP leads to a reduction of public stocks[14] although the problem surpluses are persisting also in the light of international agreements (Uruguay Round). In its document *Agenda 2000* (European Commission, 1997) we can read: "structural surplus was already provided for beef even before the situation was further aggravated by the bovine spongiform encephalopathy (BSE) crisis. Growing difficulties can also arise in areas of cereals, sugar, wine, olive oil, skimmed milk powder and certain other dairy products, and the Union risks losing more and more ground in world markets in expansion".

This reference confirms that even in the 2000s the problem of excess in relation to the CAP was still very present. At the same time, it clarifies how ineffective and inefficient were the actions taken by the EU agricultural policy to curb the problem of excess production that seems to have been totally forgotten in the European Commission document «the CAP towards 2020». The document does not even mention the word 'surplus' and above all there is no mention of the problems of unsustainable management of the production. This document focuses on food security and generally promotes the 'productivity' ignoring, however, the imbalances that may result from overproduction. In addition, we hope that in the document the CAP may contribute to the Europe 2020 objectives through a smart, sustainable and inclusive growth.

[13] The volume of agricultural production in the EEC increased between 1973 and 1988 by 2% per year, while domestic consumption only 0.5% favouring the accumulation of increasingly expensive stocks (Commission of the European Communities, 1991).

[14] They carried out a number of strategies to avoid surpluses such as, for example, in the case of cereals, arable lands were set-aside lands to keep production under control. Besides, the increased price competitiveness allowed selling significant additional quantities of products on the domestic market (Agenda 2000, 1997).

We wonder how it is possible, considering these objectives, not to mention the problems associated with production and, above all, as it is not combined with the values of sustainability, considering that food security, as well as the CAP calls, can be guaranteed not so much from production alone, but rather by careful planning and a conscious, intelligent management of the production chain in its different stages.
In the CAP policy documents towards 2020 there is no reference either to the issues related to that food loss that FAO (2014) calls "the decrease in the quantity or quality of food" or the waste "food waste which refers to the removal from the FSC of food which is fit for consumption, or which has spoiled or expired, mainly caused by economic behaviour, poor stock management or neglect". Despite the same Europe produces it (fig. 2)[15].
Even on these issues, therefore, there was an unusual silence in the CAP and therefore even more deafening, bucking the trend of the international bodies – (FAO, 2013, 2014; International Food Policy Research Institute, 2016) that recently have recognized not only an economic loss but also environmental with an ecological footprint assessment by waste[16] (FAO, 2013, De Felice, Grillotti, 2015) – and with the European Commission itself which in recent years has been interested in the problems of waste and food losses (http: //ec.europa.eu/food/safety/food_waste/stop/index_en.htm) assessing the scope.
The CAP, therefore, in its various reforms, including the one projected towards 2020, turns out to be incomplete with respect to the problems of surplus due to there being no indication of a link between the various stages of the food chain, no lines toward waste valorization - remember that Europe counts its largest waste values in the consumption phase (fig. 2) - nor any planning actions for wastes in order to be properly enhanced in the human, animal, plant or energy fields.

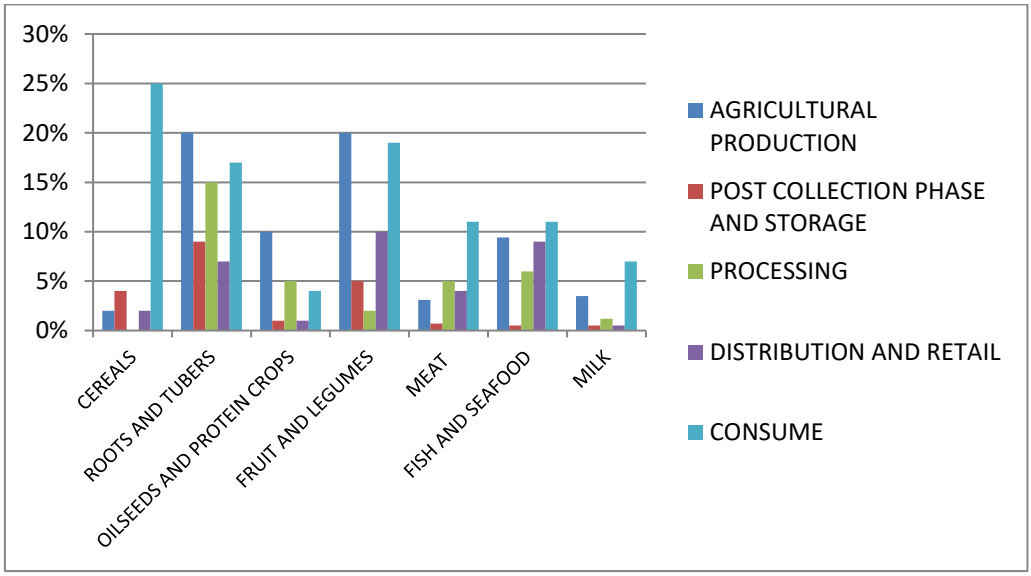

Fig. 2 – *Percentage relative to the estimated or certified waste in the different groups of products at different stages of the food chain in Europe including Russia.* Source: our processing of data FAO, 2012.

[15] The complex and delicate problem of surplus is also reflected in the terminology definition which depending on the actual perspective (social, economic, cultural etc.) takes different terms and meanings. A good summary is found in Garrone 2012. We see also FAO 2012 and International Food Policy Research Institute, 2016 that distinguishes in addition to food waste and loss also the potential food loss that takes into account the resources lost before harvest because of pests or because they are deliberately left on the fields.

[16] FAO has devoted a report to the environmental footprint of food waste and loss estimating that it is the largest emitter of carbon dioxide after the United States and China.

The CAP also plays a strategic and important role in regard to the problems of hunger[17]. The latter in some European countries (North and West) mainly takes on the meaning of malnutrition[18], which indicates overnutrition but low intake of micronutrient-rich foods. The phenomenon of hunger in Europe is to be attributed to a new latent poverty, dark, which is also gripping the population of the middle class and to a political management of the agricultural sector, which doesn't meet the sustainability values. The latter are manifested in a lack of attention to small businesses, to the enhancement of the female figure, to energy efficiency and to biodiversity.
Quantitative data confirm that around 23.7% (estimated value) of the European population is at risk of poverty (Eurostat, 2016) and this situation is manifested by the difficulty "to eat meat, fish or an equivalent protein every two days"[19](fig. 3).

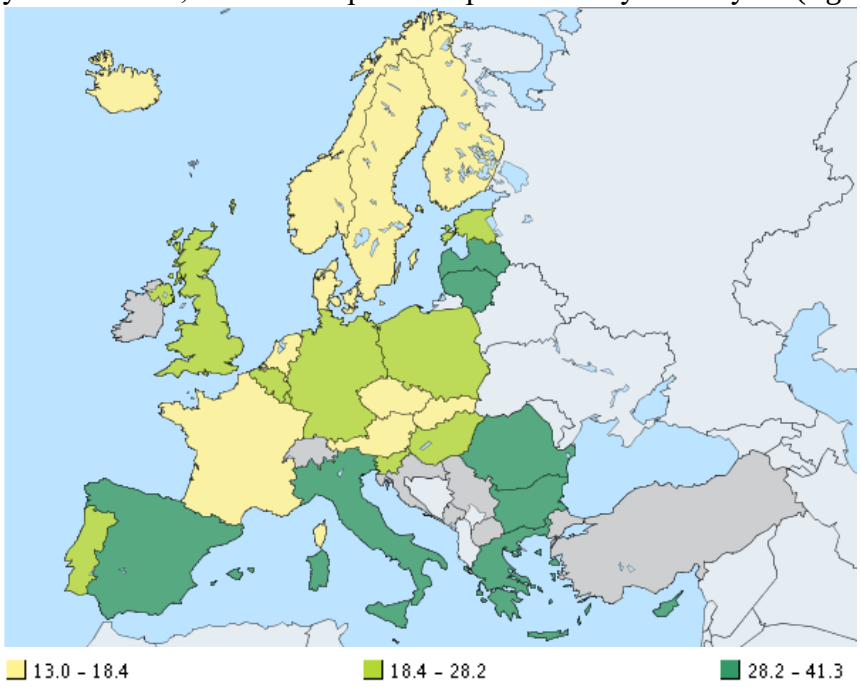

Fig. 3 – *People at risk of poverty and social exclusion in Europe. Values are expressed as a percentage of the total population*. Source: Eurostat, 2015.

[17] According to FAO, a person goes hungry if they consume an average of less than 1800 calories per day.

[18] In the EU-28 (we still include the United Kingdom), the nutrition-related problems differ among Member States. On the one hand we have some countries such as Croatia, Estonia, Latvia, Lithuania, Romania and Slovakia, where there are, though diminishing, the Index values Global Hunger - known by the acronym GHI - (von Grebmer K. et al., 2016) relating to the malnutrition, childhood decay, childhood nutritional stunting, infant mortality. The remaining European countries, however, are characterized by the food problems more closely linked to an over nutrition.

[19] This indicator is of the kind of material deprivation. Eurostat has given rise to the indicator of poverty considering people who are at risk of poverty and/or those living in material deprivation and/or those living in families where there is a lack of employment. The «material deprivation» index draws the indicators related to the economic difficulties, material assets, housing and residential environment. Disadvantaged people seriously have given up four or more of the following indicators: the inability I) to pay rent or utility bills, II) to adequately heat the house, III) to face unexpected expenses, IV) to eat meat, fish or a protein equivalent every two days, V) to go away from home on holiday one week per year, VI) to buy a car, VII) to buy a washing machine VIII) to buy a colour TV, IX) to pay a phone connection.

The CAP will not cover issues related to the overproduction of food, to the waste and loss or to malnutrition. It cares myopically about food security without the possibility of governance linked to production issues and to the management of commodities. It's the latter problems that Europe and its agricultural policy should cautiously deal with, in order to stem the paradox of a part of the population starving and another that wastes and consumes excessively.

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