Discussion Paper

Towards the Development of Guidelines for Improving the Sustainability of Diets and Food Consumption Patterns in the Mediterranean Area

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Acronyms and abbreviations list

BIOVERSITY	Bioversity International
CBD	Convention on Biological Diversity
CDO	Controlled Designation of Origin
CFS	Committee on World Food Security
CIHEAM	Centre International de Hautes Etudes Agronomiques Méditerranéennes
CIISCAM	International Interuniversity Study Centre on Mediterranean Food Cultures
CNR	Italian National Research Council, Italy
CO2	Carbon dioxide
CRA	Agricultural Research Council, Italy
CSD	Commission on Sustainable Development
CVD	Cardiovascular Disease
DEFRA	Department for Environment, Food and Rural Development, UK
EC	European Commission
EEA	European Environment Agency
EF	Ecological Footprint
EFSA	European Food Safety Authority
ENEA	National Agency for New Technologies, Energy and Sustainable Economic Development, Italy
EU	European Union
FAO	Food and Agriculture Organisation of the United Nations
FAOSTAT	FAO Statistical Database
FBSs	Food Balance Sheets
FMFC	Forum on Mediterranean Food Cultures
FDM	Fundación Dieta Mediterránea, Spain
FENS	Federation of European Nutrition Societies
FQI	Food Quality Index
GDP	Gross Domestic Product
GGE	Green Gas Emissions
GMO	Genetically Modified Organism
GNP	Gross National Product
HDI	Human Development Product
HLPE	High Level Panel of Experts on food security and nutrition
ICAF	International Commission on the Anthropology of Food and Nutrition
ICT	Information Communication Technology
IDSs	Individual Dietary Surveys
IISD	International Institute for Sustainable Development
INFOODS	International Network of Food Data Systems
IOTF	International Obesity Task Force
ITFPCHD	International Task Force for Prevention of Coronary Hearth Disease
IPCC	Intergovernmental Panel on Climate Change

IUNS	International Union of Nutritional Sciences
JRC	Joint Research Centre
LCA	Life Cycle Assessment/ Life Cycle Analysis
MAI-B	Mediterranean Agronomic Institute of Bari, Italy
MAI-M	Mediterranean Agronomic Institute of Montpellier, France
MAP	Mediterranean Action Plan
MD	Mediterranean diet
MENA	Middle East and North Africa
MSSD	Mediterranean Strategy for Sustainable Development
NCDs	Non-Communicable Diseases
NE	Near East
NGOs	Non-Governmental Organizations
NMC	Northern Mediterranean Countries
OECD	Organization for Economic Cooperation and Development
PDO	Protected Designation of Origin
PGI	Protected Geographical Indication
SCP	Sustainable Consumption and Production
SD	Sustainable Development
SDC	Sustainable Development Commission, UK
SDI	Sustainable Development Indicators
SEMC	Southern and Eastern Mediterranean Countries
SES	Socio-Economic Status
SFSP	Sustainable Food Systems Programme
SME	Small and Medium Enterprises
TSG	Traditional Speciality Guaranteed
UNCED	United Nations Conference on Environment and Development
UNDESA	United Nations Department of Economic and Social Affairs
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNCSD	United Nations Commission on Sustainable Development
UNICEF	United Nations Children's Emergency Fund
UK	United Kingdom
UOC	Universitat Oberta de Catalunya, Spain
WB	World Bank
WF	Water Footprint
WHO	World Health Organization
WSSD	World Summit on Sustainable Development
WWF	World Wildlife Fund for Nature
10YFP	10 Years Framework of Programmes

Executive Summary

- The challenge of feeding the growing world population, which is expected to reach 9 billion people in 2050, requires new strategies to ensure food security, in which dietary patterns are important drivers for building sustainable agricultural and food systems.
- Today, the main challenge for the food and agricultural sector is to simultaneously provide enough food, in quantity and quality, to meet nutritional needs and to conserve the natural resources for present and future generations.
- FAO estimates that in 2050 to satisfy the demand of a growing and richer population, with an increased meat demand, food production will have to increase by at least 60 percent in the next decades.
- This figure can be reduced by improving production efficiency, changing diets and decreasing food losses and waste.
- Food consumption and production trends and patterns are among the most important drivers of environmental pressures.
- Given the importance of diets for health and as drivers of environmental pressure, steps must be taken as a matter of urgency to monitor and measure sustainable diets through analysis of information, development of methods and indicators, and development/promotion of policy guidelines.Recently, FAO has started to address the issue of sustainable diets and to develop methods and indicators for assessments in different agro-ecological zones.
- The Mediterranean diet has been scientifically well-characterized and is recognized as a healthy dietary pattern. It is also being analyzed in many surveys and appreciated for its lower environmental impact.
- The Mediterranean diet has been widely scientifically reported to be a model of healthy eating, and a greater adherence to the Mediterranean diet has been associated with significant improvements in health status.
- But, despite the well-documented health and environmental benefits of the Mediterranean diet, current data show a decline in adherence in the Mediterranean area to the Mediterranean diet pattern.
- For these reasons, and because it concerns a vast number of countries, the Mediterranean diet has been selected by FAO as a model to for the assessment of the sustainability of diets.
- On the occasion of the 9th Meeting of the CIHEAM Ministers of Agriculture, held in 2012 in Malta, the technical cooperation between FAO and the CIHEAM-Bari for the development of the session on "Food Systems and Sustainable Diets: The

Mediterranean diet as a Pilot Study", within the International Seminar on "The Sustainability of Food Systems in the Mediterranean Area", represented an important starting point of collaboration by having in the CIHEAM Ministers' final declaration (Annex 1) the recommendation to the International Organizations to support the implementation of the recommendations formulated during the International Seminar (Annex 2).

- CIHEAM, as an intergovernmental organization dealing with agriculture, rural development, food and natural resources management in the Mediterranean, is very active in promoting programs/projects towards the improvement of the sustainability of Mediterranean agro-food systems.

- The case study of the Mediterranean diet as a sustainable diet model should contribute to clarify how to improve the sustainability of food systems in different agro-ecological zones. Its aim is to contribute to the development of indicators and guidelines to improve the sustainability of the diets and food systems, in order to help address the challenges faced by food systems in the Mediterranean area.

Introduction

Today, the main challenge for the food and agricultural sector is to simultaneously provide enough food to meet nutritional needs and to conserve the natural resources for present and future generations. FAO estimates that in 2050 to satisfy the demand of a growing and richer population, with an increased meat demand, food production will have to increase by at least 60 percent in the next decades. This figure can be reduced by changing diets and decreasing food loss and waste.

Food consumption and production trends and patterns are among the most important drivers of environmental pressures. Agro-food systems need to grow within the context of a finite and sometimes shrinking resource base and need to make use of the natural resources in a sustainable manner and conserve the ecosystem base. Such growth needs to be inclusive and target broader objectives than production and include efficiencies along the whole food chain and promote sustainable practices and diets. This can be achieved through sustainable food consumption and production linked to the enhancement of more sustainable diets models. Recently, FAO has started to study the notion of sustainable diets in order to design methods and indicators towards their assessment in different agro-ecological zones.

The Mediterranean diet has been well scientifically characterized. It is also recognized as a healthier dietary pattern. It has further started being analyzed in many surveys and appreciated for its lower environmental impact. For these characterizations and, because it concerns a vast number of countries, the Mediterranean diet recognized by UNESCO as an intangible cultural heritage has been selected by FAO as its first case study for the assessment of the sustainability of diet models.

On occasion of the 9th meeting of the CIHEAM Ministers of Agriculture, held in 2012 in Malta, the technical collaboration between FAO and the CIHEAM-Bari for the development of the session on "Food Systems and Sustainable Diets: The Mediterranean diet as a Pilot Study, within the International Seminar on "The Sustainability of Food Systems in the Mediterranean Area", represented an important opportunity toward the development of guidelines to assess and to improve the sustainability of Mediterranean diets as a case study for sustainable diets' development.

CIHEAM, as an intergovernmental organization dealing with agriculture, rural development, food and natural resources management in the Mediterranean, is very interested in improving the sustainability of Mediterranean agro-food systems. In the conclusions of the 3rd Meeting of the Ministers of Food, Agriculture, and Fisheries of CIHEAM's Member Countries in 2001, in Athens, was highlighted the importance of promoting the Mediterranean diet as an instrument for the development of Mediterranean countries. The same commitment was confirmed in the 7th Meeting held in Zaragoza, in 2008, during which, in order to support and share the nomination of the Mediterranean diet as intangible heritage of humanity by UNESCO, was signed by the 13 Ministers and their delegates the following statement:

"…*being an extraordinary intangible cultural heritage that unites and identifies us, and for its strategic importance at social, territorial, environmental, landscape, economic, productive and healthy levels, the CIHEAM member countries support the proposed nomination, so that the UNESCO may recognize the Mediterranean diet as Intangible Cultural Heritage of Humanity*".

In the Final Declaration of the 8th Meeting of the CIHEAM Ministers of Food and Agriculture, held in 2010 in Istanbul, it was recommended to the CIHEAM: to "*work to promote a healthy and sustainable regional food production system following the standards of the Mediterranean diet that foster the spirit of conviviality and favour consumption of local and seasonal products, particularly by encouraging regional networks to support public decisions for the protection, promotion and marketing of Mediterranean products and the development of environmentally sound agricultural production systems*" (CIHEAM, 2010).

In the *2005 UNEP Mediterranean Strategy on Sustainable Development Report* was forecasted a threat to Mediterranean food systems as well as a decline of the Mediterranean's healthy diet patterns: *Mediterranean agricultural and rural models, which are at the origins of Mediterranean identity, are under increasing threat from the predominance of imported consumption patterns. This trend is illustrated in particular by the decline of the Mediterranean dietary model despite the recognized positive effects on health* (UNEP/MAP, 2005).

In 2010, FAO and Bioversity International organized an international scientific symposium on "biodiversity and sustainable diets", in which one session, in collaboration with CIISCAM/CIHEAM-Bari/INRAN, was devoted to "the Mediterranean diet as an example of a sustainable diet". Its purpose was to mainstream, as a common path, biodiversity, nutrition and sustainable diets, as central to sustainable development. As one of the symposium's major outcomes, a consensus position was reached on the following definition of "sustainable diets": *Sustainable diets are those diets with low environmental impacts which contribute to food and nutrition security and to healthy life for present and future generations. Sustainable diets are protective and respectful of biodiversity and ecosystems, culturally acceptable, accessible, economically fair and affordable; nutritionally adequate, safe and healthy; while optimizing natural and human resources* (FAO/Bioversity, 2010).

Given the importance of diets for health and as drivers of environmental pressure, steps must be taken as a matter of urgency to monitor and measure sustainable diets through analysis of information, development of methods and indicators, and development/promotion of policy guidelines. The assessment and development of sustainable diet models will foster a broader consensus for action in nutrition-sensitive agriculture by rising up awareness among consumers and governments that agriculture, food, nutrition, health, culture, environment and sustainability are strongly interdependent to each other.

The methodological approach described in this discussion paper takes into consideration the potential wide range of diverging criteria to define sustainability indicators. This activity

represents the continuation of the participatory consensus position process, applied in 2009 for the revision of the Mediterranean diet pyramid and in 2010 for the definition of "sustainable diets. Its aim is to contribute to the development of indicators and guidelines to improve the sustainability of the diets and food systems, in order to help address the challenges faced by food systems in the Mediterranean area.

1. The Mediterranean diet as a case study for sustainable diets

The case study of the Mediterranean diet as a sustainable diet model should contribute to clarify what is required for an environmentally sustainable food system and more eco-friendly food based dietary guidelines. This case study should guide innovative intersectoral efforts to counteract the degradation of ecosystems, loss of biodiversity and simplification of diets through the improvement of sustainable dietary patterns.

The Mediterranean diet concept, acknowledged by UNESCO as an intangible cultural heritage, has nutritional, economic, environmental and socio-cultural characteristics that make it particularly relevant as a case study for the characterizing sustainable diets in different agro-ecological zones. The importance of the Mediterranean diet as an example of a sustainable diet lies not only in its specific foods and nutrients, but in the methods used to characterize and analyze it and the philosophy of sustainability that is at its core (Burlingame and Dernini, 2011).

The Mediterranean diet has been widely scientifically reported to be a model of healthy eating and a greater adherence to the Mediterranean diet has been associated with a significant nutrition and health benefits (Willett *et al*, 1995; Nestle, 1995; ITFPCHD, 2000; Serra-Majem *et al*, 2006; Sofi *et al*, 2008; Maillot *et al*, 2011).

The Mediterranean diet, through its new revised pyramidal representation (Bach *et al*, 2011) shows that it not only offers considerable health benefits, but also respects the environment. In fact, the various represented food groups in the pyramid can be also evaluated in terms of their environmental impact.

The Mediterranean-type diet has also been studied and analyzed for its low environmental impact (Gussow, 1995; Duchin, 2005; Baroni *et al*, 2007; EC/JRC, 2009; Barilla Center for Food and Nutrition, 2010).

But despite the well documented health and environmental benefits of the Mediterranean diet, current data are showing a decline in adherence in Northern, Southern and Eastern Mediterranean countries (IOTF, 2005; Garcia-Closas *et al*, 2006; Belahsen and Rguibi, 2006; da Silva *et al*, 2009; Vareiro *et al*, 2009; León-Muňoz *et al*, 2012).

Therefore it is appropriate to investigate the Mediterranean diet as a case study to assess and to improve the sustainability of the diets in different regional and cultural contexts.

1.1 Sustainable diets as a driver for sustainable consumption and production

The challenge of feeding the growing world population, which is expected to reach 9 billion people in 2050, requires new strategies to ensure sustainable food security (Godfray *et al*, 2010). Eating patterns, which are important drivers for building sustainable agricultural and food systems, are often neglected in the research and policy areas (Guyomard *et al*, 2011).

In the early 1980s, the notion of "sustainable diets" started to be explored to recommend diets which would be healthier for the environment as well as for consumers (Gussow and Clancy, 1986). With food globalization and the increased industrialization of agricultural systems, with no attention to the sustainability of agrofood ecosystems, the sustainable diet concept was abandoned for many years.

Recently, the interest in sustainable diets has again been raised by international scientific societies and UN agencies (American Dietetic Association, American Nurse Association, American Planning Association and American Health Association, 2010; American Public Health Association, 2007; DEFRA, 2009, 2011; FAO/Bioversity, 2012c; FAO, 2010, 2012d; UNEP, 2012a, 2012b; UNSCN, 2012). A growing body of evidence of the non- sustainability of current dietary trends published in technical reports (EC/JRC, 2009; SDC, 2009, 2011; WWF, 2011; Esnouf *et al*, 2011; Pluimers and Blonk, 2011; Guyomard *et al*, 2011) has further raised the attention on sustainable diets as an important element for a shift towards sustainable food consumption and production.

Food consumption is variably affected by a whole range of factors including food availability, food accessibility and food choice, which in turn may be influenced by geography, demography, disposable income, socio-economic status, urbanization, globalization, religion, culture, marketing, and consumer attitude (Kearney, 2010). A recent study indicates an inverse relationship between the two main drivers behind increased land requirements for food production: with socioeconomic development, population growth decreases and, at the same time, diets become richer. In many regions, dietary change may override population growth as major driver behind land requirements for food in the near future (Kastner *et al*, 2012).

There is growing evidence of the cost of diets on the environment, society and public health nutrition (Haines *et al*, 2009; Holdsworth, 2010; Hawkesworth *et al*, 2010; Lock *et al*, 2010; O'Kane, 2012; Delaney Burke, 2012; Clonan and Holdsworth, 2012). A growing body of research is showing that the achievement of substantial reductions in food-related GHG emissions to mitigate climate change must be addressed, not only by how we produce and distribute our food but also by what we eat (Marlow *et al*, 2009; Garnet, 2011; Macdiarmid *et*

al, 2012; Vieux *et al*, 2012). Recommendations for lowering energy inputs and greenhouse gas emissions from household food consumption include diets with less meat and dairy products, more in-season vegetables and more locally produced and fresh foods (Carlsson-Kanayma, 1998, 2009; Carlsson-Kanayma *et al*, 2003).

In a recent European Commission study (EC/JRC, 2009), which analyzed the impact on the European environment caused by changes to European diets, showed that current food consumption accounts for 27% of all environmental impacts in the EU-27, and highlighted a prominent role of meat production in environmental impacts generated along the food chain. The results of the study were that a change of diet (reduced consumption of red meat) will have a twofold benefit: it will help decrease diet-related non-communicable diseases (NCDs) and will also reduce by 8% the environmental impact generated through food consumption, representing 2% of the total environmental impacts caused by all final consumption. Also, the European study pointed out that suggested dietary changes imply changes in the structure of agricultural and food production sectors and that the impact on existing production structures would be limited, while more environmental benefits from a change in diet in the EU-27 will occur at a global level (EC/JRC, 2009).

According to recent studies on the issue of "food miles", transport represents only a small part of overall food chain emissions and, therefore, "food miles" are estimated as a poor indicator of food environmental impacts (Garnet, 2011; Edwards-Jones *et al*, 2008; Weber and Matthews, 2008; AEA Technology Environment, 2005), even if it does vary considerably, in terms of country of origin and cultivation or production systems (Sim *et al*, 2007). It is important to acknowledge that 'food miles' should not be used as a main indicator for the environmental impacts of food products. The assumption that locally grown food is better for the environment is not always true, as some regions of the world employ more resource-efficient practices than others for the same production (Kissinger, 2012).

Sustainability, water, food security and diets are intimately connected. With rising incomes and urbanisation, dietary patterns with pronounced regional and cultural differences are shifting towards consumption patterns higher in animal products, which are increasing water demand (Renault and Wallender, 2000; Lundqvist *et al*, 2008). Dietary patterns with high meat consumption require more energy, water and land resources (Pimentel and Pimentel, 2003; Gerbens-Leenes and Nonhebel, 2005).

The Sustainable Food Systems Programme, jointly led since 2011 by FAO and UNEP, aims at improving resource use efficiency and reducing the pollution intensity of food systems from production to consumption, and is addressing the issue that changes in production patterns should be demand and consumer-driven, and should originate from sustainable diets of well-informed consumers.

1.2 The Mediterranean diet

In 2010, the inscription of the Mediterranean diet on the UNESCO Representative List of the Intangible Cultural Heritage of Humanity was approved with the following description:
The Mediterranean diet constitutes a set of skills, knowledge, practices and traditions ranging from the landscape to the table, including the crops, harvesting, fishing, conservation, processing, preparation and, particularly, consumption of food. The Mediterranean diet is characterized by a nutritional model that has remained constant over time and space, consisting mainly of olive oil, cereals, fresh or dried fruit and vegetables, a moderate amount of fish, dairy and meat, and many condiments and spices, all accompanied by wine or infusions, always respecting beliefs of each community. However, the Mediterranean diet (from the Greek ***diaita,*** *or way of life) encompasses more than just food. It promotes social interaction, since communal meals are the cornerstone of social customs and festive events.* (UNESCO, 2010).

The Mediterranean diet is the result of the millennial history of the Mediterranean. The Mediterranean diet is transmitted from generation to generation, and it is constantly recreated by communities and groups in response to the change of their environment and their history.
The general term "*Mediterranean diet*" implies a common dietary pattern in Mediterranean countries, however, there are differences in the dietary patterns of the Mediterranean populations (Keys, 1970; Kromhout *et al*, 1989; Trichopoulou and Lagiou, 1997). The Mediterranean diet is characterized by its links to the various food cultures and traditions of the different countries of the Mediterranean area. Mediterranean diets are far from homogeneous; they involve a wealth of typical products and are extremely varied. This "*dietary polymorphism*" partially reflects religious and cultural differences (Manios *et al*., 2006). The most important factors that contributed to this huge diversity of foods and diets in the Mediterranean are: extremely varied geographical and ecological environments; succession of different dominant peoples (Greeks, Carthaginians, Romans, Arabs, Byzantines, Ottomans, Spanish, Portuguese, etc.) that introduced and/or diffused different crops and foods.

There is a contrast in food intake structure between the Northern Mediterranean countries, Balkan countries and Southern Mediterranean countries. Diets in Southern Mediterranean countries are mainly vegetarian as only a small share of calories is of animal origin; cereals are the basic ingredient and pulses the main protein source. In Northern Mediterranean countries, food intake has higher animal produce content. Balkan countries have an intermediate diet and intake structure; diet is richer in animal products than in Southern Mediterranean countries but contains more cereals and pulses than in Northern Mediterranean countries (Padilla, 2008). It is worthy of note that significant dietary differences can be observed even within the same country. In Italy, for instance, the consumption of cereals, fruit and vegetables is higher in the southern part of the country (Lupo, 1997).

The health benefits of the Mediterranean Diet and its prophylactic effect against chronic diseases has been well established by the scientific community, since the pioneer *Seven*

Countries Study, conducted by Ancel Keys, established the association of a traditional Mediterranean dietary pattern with a markedly reduced incidence of coronary heart disease mortality (Keys, 1970, 1975, 1980). On the basis of this initial knowledge, scientists constructed dietary scores of adherence to the traditional Mediterranean Diet by indexing positively those beneficial foods which are mostly consumed in traditional Mediterranean diets and negatively the foods less consumed and more typical of the western industrialized world (Trichopoulou *et al*, 1995; Menotti *et al*, 1999; Sánchez-Villegas, 2003; Fidanza *et al*, 2004; Serra-Majem *et al*, 2004, 2006; Bach *et al*, 2006; Gerber, 2006; Issa *et al*, 2011). Indeed, numerous more recent studies confirmed that good adherence to the traditional Mediterranean Diet is systematically associated with a markedly reduced risk of cardio - vascular events and mortality (Trichopoulou *et al*, 2003, 2005, 2009; Martínez-González *et al*, 2002, 2009; Estruch *et al*, 2006; Buckland *et al*, 2008, 2009; de Lorgeril *et al*, 1994; Mendez *et al*, 2006; Panagiotakos *et al*, 2006; Sánchez-Villegas *et al*, 2006; Zazpe *et al*, 2011); with a lower incidence of the metabolic syndrome (Tortosa *et al*, 2007; Babio *et al*, 2009; Kastorini *et al*, 2011; Kesse-Guyot *et al*, 2012) and of type 2 diabetes (Martínez-González *et al*, 2008). The data from a series of case-control studies showed in general that high intake of foods typical of the traditional Mediterranean dietary pattern – i.e. fruit, vegetables, whole grains, olive oil and fish – were associated with a reduced risk of developing various types of cancers (La Vecchia, 2004; Bosetti *et al*, 2009; Vernele *et al*, 2010).

In 2005, with "the Rome Call for a Common Action on Food in the Mediterranean" (CIISCAM, 2005), was further re-activated the process of interdisciplinary dialogue started in 2002 by the Forum on Mediterranean Food Cultures, CIHEAM MAI-Bari, Mediterranean Diet Foundation and Sapienza University of Rome, among the international Mediterranean diet scientific community for a consensus position on a redefinition of the Mediterranean diet (Serra-Majem *et al*, 2004a). This process allowed in 2009, at the 3rd International CIISCAM Conference, held in Parma, Italy, to reach a consensus position on a new revised updated and unpatented Mediterranean diet pyramid as well as on the Mediterranean diet as an example of a sustainable diet (CIISCAM, 2009). In 2010, this new Mediterranean diet pyramid was further developed at the 8th International Congress on the Mediterranean diet, held in Barcelona, Spain (Bach-Faig *et al*, 2011; Dernini *et al*, 2012).

The new revised Mediterranean Diet pyramid was conceived as a simplified main frame in order to be adapted to the different country specific variations related to the various geographical, socio-economic and cultural contexts of the contemporary Mediterranean lifestyle. To counteract the current dramatic decline of the healthy traditional Mediterranean diet pattern all around the Mediterranean area, it was aimed at better popularizing its applicability for present daily lifestyle, without leaving out the different cultural and religious traditions and different national identities present in the Mediterranean area. The concept of frugality and moderation was emphasized because of the major public health challenge of obesity.

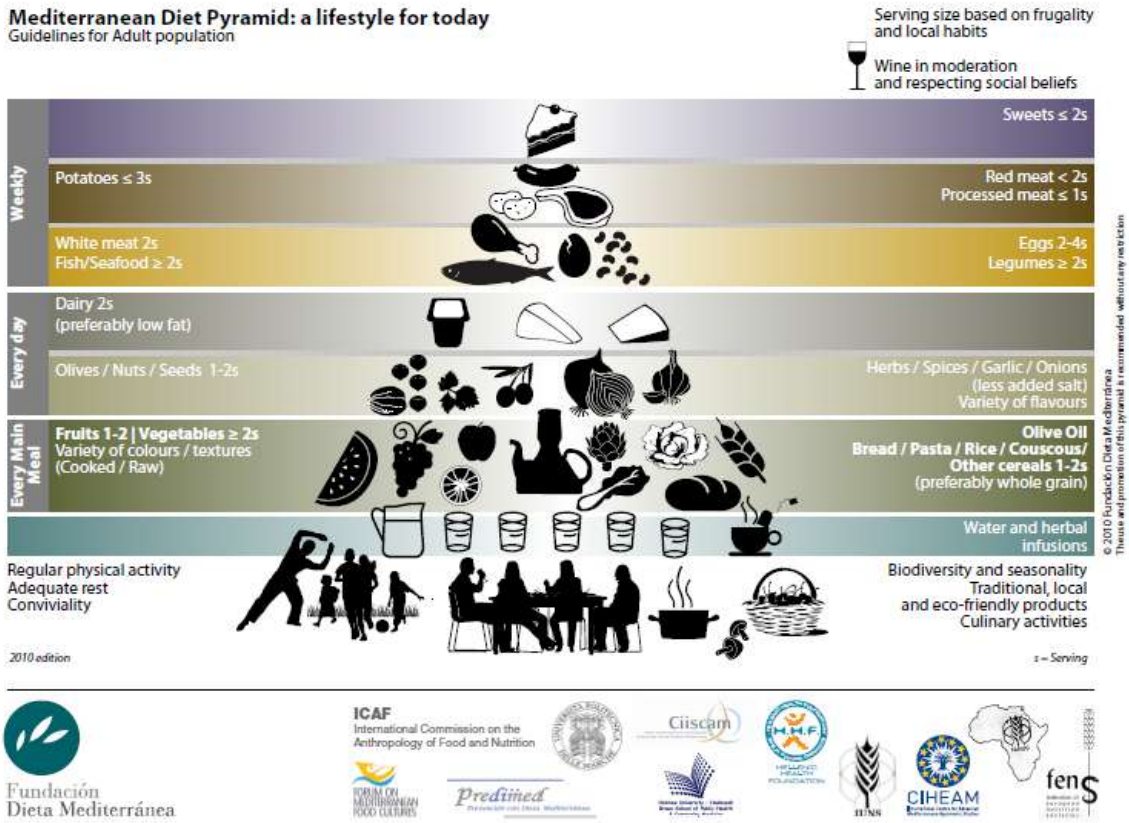

Fig. 1. The new Mediterranean diet pyramid (Source: Bach-Faig *et al*, 2011).

This new revised Mediterranean diet was presented as an example of a sustainable diet, in which nutrition, local food productions, biodiversity, culture and sustainability are strongly connected together, with a lower impact on the environment. The concepts of seasonality, fresh and locally grown products, culinary activities, biodiversity, traditional, local and eco-friendly products, of variety of colors for fruits and vegetables were introduced together with main meals, conviviality and physical activity. Main foods included in the common food basket are: an abundance of olive oil and olives, fruits, vegetables, cereals (mostly unrefined), legumes, nuts and fish, moderate amounts of dairy products (preferably cheese and yoghurt) and low quantities of meat and meat products. Wine in moderation was considered acceptable when it was not contradictory to religious or social norms.

The Mediterranean agrarian landscape, in its ecological, cultural, social and economic dimensions, is mostly a food-based landscape inextricably linked to the Mediterranean diet.
Food's symbolic value of identification and differentiation has led to the creation of strong links between local food and local heritage and identity, the construction of *cuisines de terroir(s)* and according economic value to local-food producing knowledge and skills through the establishment, for example, of systems modeled on geographical indication of provenance (FAO, 2004; 2009b). These products of origin-linked quality are strongly connected to the sustainability of the Mediterranean area by contributing to rural development and the preservation of biodiversity.

2. Methodological framework for the assessment of the sustainability of the Mediterranean diets

2.1 Background

The development of a shared methodological approach for the assessment of the sustainability of Mediterranean diets was a multi-step consultation process whose main milestones were the following:

- 3rd CIISCAM Conference on "The Mediterranean Diet Today: A Model of Sustainable Diet", Parma, 3 November 2009;
- 8th Mediterranean Diet Foundation Conference, International Congress on the Mediterranean Diet, Barcelona, March 2010;
- Talk Show on "The Mediterranean Diet, an Example of Sustainable Diet", organized by FAO/Bioversity International/INRAN,/CIISCAM/ CIHEAM MAI-Bari/ENEA/COOP, within the Biodiversity Week, Rome, 21 May 2010
- FAO Technical Workshop on "Biodiversity in Sustainable Diets", Rome, 31 May-1 June 2010
- INRAN/CIHEAM MAI-Bari/CIISCAM Session on "The Mediterranean Diet as an Example of Sustainable Diet" within the FAO/Bioversity International Symposium on "Biodiversity and Sustainable Diets: United Against Hunger", Rome, 5 November 2010;
- CIHEAM MAI-Bari International Seminar on "Sustainability of the Mediterranean Diets", Bari, 26-27 May 2011;
- CIHEAM MAI–Bari International Workshop on "Guidelines for Improving the Sustainability of the Mediterranean Diet", Bari, 28-29 November 2011;
- FAO Satellite Conference at NUTRIMI 2012 on "Food Chains, Food Systems and Sustainable Diets: The Mediterranean Diet as a Case Study", Milan, 14 March 2012;
- CIHEAM MAI-Bari Seminar at World Water Forum on "Mediterranean Diet: Sustainable Diet Model", Marseille, 16 March 2012;
- CIHEAM Seminar, in preparation of the 9th Meeting of CIHEAM Ministers of Agriculture, on "The Sustainability of Food Systems in the Mediterranean Area:, Malta, 25-26 September 2012.

The first working draft for the development of guidelines for improving the sustainability of the diets in the Mediterranean area was formulated at the international workshop organised by the CIHEAM-Bari on November 28-29, 2011. The workshop brought together 51 experts (nutritionists, agronomists, economists, social scientists) from the EU, Balkans, North Africa and Middle East as well as from international organisations, with the purpose of identifying a methodological approach for assessing the sustainability of the Mediterranean diets. A Task Force was established by the participants on a voluntary basis with the purpose of identifying methods and indicators for assessing the sustainability of the Mediterranean diet (Annex 1).

2.2 Methodological approach

The international workshop held in Bari, in November 2011, built upon the previous outcomes from the FAO technical workshop on "Biodiversity in Sustainable Diets" (FAO, 2010), where the three main sustainability pillars, economic, social and environmental, have been integrated by the dimensions of nutrition, health, and culture. Four main thematic areas were identified: 1) nutrition, health and lifestyle; 2) environment including agro-biodiversity 3) economy; 4) society and culture. Then, within these four main thematic areas, and taking also into account the Bellagio sustainability assessment and measurement principles (IISD/OECD, 2009), a first list of potential indicators was compiled which could be used to monitor the main issues related to the assessment of the Mediterranean diet's sustainability (Annex 1).

Following several meetings jointly conducted by CIHEAM MAI-Bari and FAO, in Rome, from January to June 2012, with ENEA, CNR, INRAN, Bioversity International, WWF-Italy, from this initial list of 74 potential indicators, was produced a second list of around 20 indicators, as the most effective and feasible considering the availability of data sources (Annex 2). At the same time, a methodological approach started to be elaborated to compile these indicators within an integrated framework (Annex 2).

Through a brainstorming process conducted online, from June to September 2012, with the participants to the Task Force, established at the 2011 CIHEAM MAI-Bari International Workshop, the following steps were identified for the development of a methodological framework for the development of guidelines for improving the sustainability of the diets in the Mediterranean area:

- Identification of priority challenges, within the 4 main proposed thematic areas (nutrition and health; environment including agro-biodiversity; economy; society, culture), to reduce the unsustainable pressures on existing limited and vulnerable resources, and, therefore, to improve the sustainability of the diets and food consumption and production patterns in the Mediterranean area. The discussion on where to position lifestyle is still pending, whether it belongs to the thematic area of nutrition and health or to the thematic area of socio-cultural factors.
- Identification of the most feasible indicators and related existing data source, within the 4 main proposed thematic areas, to address the identified sustainability priority challenges, starting from the 13 CIHEAM members countries[1].
- Choose one or more Mediterranean countries, within the CIHEAM members countries, to apply the MD pyramid model (Bach-Faigh *et al*, 2011), to be adapted to each country, as a comparison framework to current country food consumption patterns;

[1] CIHEAM is an intergovernmental organisation comprising thirteen member countries from the Mediterranean Basin: Albania, Algeria, Egypt, France, Greece, Italy, Lebanon, Malta, Morocco, Portugal, Spain, Tunisia and Turkey.

- Assess food consumption patterns in selected countries by using recent food consumption surveys (including dietary diversity surveys) and food balance sheets/supply utilization account data;

For nutrition indicators

a. Calculate country-specific current consumption patterns, in terms of dietary energy, protein, fat, and selected micronutrients;
b. Assess these consumption patterns for their adherence to the new revised MD pyramid;

For environment and economic indicators

a. Identify for each selected country where the food comes from (locally produced and/or imported);

- Calculate a value/score using the data gathered for each indicator;
- Combine all scores into a scale of the diet sustainability (to be further discussed). It will help monitor trends in the sustainability of the diet over time. Changes in national-level indicators between periods will indicate whether a country is moving towards, or away from, sustainability;
- Assess from this set of indicators/scores the relationship between current dietary patterns, adherence to the MD pattern and sustainable food consumption and production at country level. This set of scores/indicators provides a framework for assessing the relationship between MD, sustainable diets and sustainable development;
- Develop a framework for country-based guidelines for improving the sustainability of the Mediterranean diet;
- Present the above framework to an international expert workshop to gather a consensus position.

For each indicator, used to measure progress towards the sustainability of the diet, the framework for the development of the guidelines will provide all or some of the following information: a simple operational definition; the goal and target it addresses; the rationale for use of the indicator; the method of computation; sources of data; references, including relevant international Web sites; periodicity of measurement; gender and disaggregation issues; limitations of the indicator; national and international agencies involved in the collection, compilation or dissemination of the data (UN, 2003). The intention is not to provide an exhaustive amount of information for each item, but to provide a reference point and guidance for country teams and national stakeholders.

To establish the causal relationships between all indicators and thematic areas is a very complicated task, a multi-phase process. Considerable amounts of data are required in order to estimate the sustainability of diets. Data alone, however, are useless without appropriate tools and resources for their efficient exploitation.

2.3 Priority sustainability challenges

Recent trends and projections in the Mediterranean area (UNEP/MAP/Plan Bleu, 2011, 2010, 2008, 2006; Plan Bleu, 2012; FAO, 2012a; UNEP/MAP, 2005) were taken into consideration to identify priority challenges to be addressed for improving the sustainability of the diets and food consumption patterns in the Mediterranean area.

2.3.1 Nutrition and health: Malnutrition and decline of the adherence to the Mediterranean diet pattern

The Mediterranean area could be described as passing through a "nutritional transition" in which problems of under-nutrition coexist with overweight, obesity and food-related chronic diseases.

Under-nutrition is still significant in the South of the Mediterranean: 9.2 million people in 2001-03, 3.9% of the population of the zone, compared with 7.3 million people in 1990-92, 3.8% of the population (CIHEAM, 2008). The rate of stunting amongst children under five years of age is also very high in many countries in the South: 18% in Algeria, 21% in Egypt, 12% in Lebanon, 24% in Morocco, 12% in Tunisia, and 16% in Turkey.

According to WHO, overweight and obesity rates in Mediterranean countries continue to rise. Currently reported rates for overweight and obesity are as follows: 54.4 and 21.3% in Albania; 45.5 and 16.0% in Algeria; 67.9 and 33.1% in Egypt; 50.7 and 18.2% in France; 53.7 and 20.1% in Greece; 54.1 and 19.8% in Italy; 61.8 and 27.4% in Lebanon; 64.3 and 28.8% in Malta; 46.8 and 16.4% in Morocco; 59.1 and 24.0% in Portugal; 62.0 and 26.6% in Spain; 53.7 and 22.3% in Tunisia; and 61.9 and 27.8% in Turkey (WHO, 2011).

Recent surveys are pointing out that many countries in the Mediterranean area are drifting away from the Mediterranean diet healthy pattern and current Mediterranean food consumption patterns show a decline in their adherence to Mediterranean diet (IOTF, 2005; Garcia-Closas *et al*, 2006; Belahsen and Rguibi, 2006; da Silva *et al*, 2009; Vareiro *et al*, 2009; León-Muñoz *et al*, 2012). In the decline of the adherence to the MD, there are two major concerns: an increase in the consumption of lipids (*e.g.* meat, dairy products, etc.) and a decrease in the consumption of complex carbohydrates (e.g. cereals and legumes). A recent study clearly evidenced the easiest way to reach all nutrient recommendations is to select more Mediterranean-type food (Maillot *et al*, 2011).

In the Southern Mediterranean countries, populations are suffering from under-nutrition as well as chronic nutrition-related diseases, which are increasingly leading to disabilities and death. The data reported on this region show that there is a shift in dietary habits from a traditional Mediterranean Diet to industrial food, which could explain in part the nutritional and metabolic disorders reported in the region's population. Unhealthy eating practices in the Southern Mediterranean countries include high consumption of saturated fats and refined

carbohydrates, low consumption of fiber, and sedentary behaviour (Belahsen and Rguibi, 2006).

In the Northern Mediterranean countries, there is a growing trend of obesity and over-weight with increased chronic nutrition-related diseases. There are three trends which can be identified here: 1) a tremendous increase in the consumption of lipids, which is explained by the higher consumption of animal fats (dairy products and meat, consumption increasing as income rise), but even more by the consumption of vegetable oils used for cooking and seasoning or included in various industrial foodstuffs; 2) an increase in the consumption of simple carbohydrates, connected in particular with the consumption of beverages and foodstuffs with a high carbohydrate content, and a simultaneous decrease in the consumption of starches (bread consumption has dropped by half in the last 50 years in France, and potato consumption has dropped by two-thirds over the same period); and 3) a change in the total protein content, where the share of animal proteins is increasing to the detriment of vegetable proteins (Padilla, 2008).

The Mediterranean diet is inextricably linked to biodiversity. Indeed, biodiversity plays a key role in ensuring dietary diversity as nutrient composition between foods and among varieties/cultivars/breeds of the same food can differ dramatically. In order to guarantee that local Mediterranean diets are healthy, and that the average levels of nutrient intake is adequate, it is important that biodiversity level is kept high. Mediterranean local food biodiversity has received relatively little attention on its nutritional value in the scientific literature, especially on nutraceuticals from plant species, with potential health beneficial effects, traditionally used in rural communities (Heinrich *et al*, 2006).

2.3.2 Economy: population growth, urbanization, food prices, food waste

Population growth in the Mediterranean Basin is marked by a widening gap between the northern and southern shores: in the North, the growth rate is leveling off and the population is ageing, whereas the population in the South is increasing rapidly and steadily. Between 1990 and 2010, the Mediterranean population has grown at an average annual rate of 1.16 %, from 374 million to 473 million inhabitants. Today, 25% of the Mediterranean population is under 15 years of age and 25% of the 15 to 24-year olds are unemployed. As demonstrated in the recent events of the Arab spring, the construction of a sustainable future for the Mediterranean's young population is one of tomorrow's major challenges (Plan Bleu, 2012).

For the Mediterranean area, the globalisation of the economic field is introducing changes in the distribution and availability of food products (imports, commercial innovation, transformation of retail sales) while are simultaneously being introduced changes in lifestyles and food habits as a result of this transition from tradition to modernity (Florensa and Aragall, 2012).

The urbanization of the society, the integration of women into the labor market and the retail development are deeply modifying Mediterranean dietary patterns. New forms of distribution and sales are increasing the availability of determined food products leading to a loss of the Mediterranean food structure in northern countries and notable food imbalances in southern countries (Florensa and Aragall, 2012).

Within the globalization process, the pressure from the agro-food market has forced the abandonment of some crops, long established livestock farming techniques and traditional crafts. It has imposed new networks and sales systems, and modified consumption habits. This impact entails loss in knowledge and practices that have contributed historically to the identity of the Mediterranean peoples and have configured a rich and complex food universe in the Mediterranean area (González Turmo, 2012).

Ancient vineyards, orchards and olive groves have been ripped out to make way for large scale fruit or olive plantations and mixed rotational farming has been replaced by intensive monocultures. This has not only caused the loss of wildlife-rich habitats but has also had a major socio-economic impact on large parts of the region as many small-scale farmers have been forced to abandon their land to go and search for jobs elsewhere (Padilla *et al*, 2012).

Price volatility has a strong impact on the poor and on food importing countries, especially where diets are less diversified. It also risks modifying diets, especially of the poorest as they tend to shift to cheaper and less preferred, and often poorer quality foods (HLPE, 2011).

The distribution of food losses and waste along the food chain vary between regions. Relatively speaking, losses in the first part of the food chain, which are due to poor harvesting techniques, lack of transport and poor storage in combination with climate conditions, are more important in developing countries (Lundqvist *et al*., 2008), where 40% of food losses occur at the post-harvest and processing level while in industrialised countries more than 40% of the losses occur at the retail and consumer level, i.e. food is wasted (FAO, 2011b).

Reducing in the entire Mediterranean area the amount of food wasted throughout the food chain (i.e. from farm to fork) would help improve food security and nutrition. Furthermore, reducing food losses and waste will also contribute to ease pressure on water scarcity. To do so, it is crucial to alert consumers to the environmental impacts of their diets and of wasting food.

In Italy, some 20 million tonnes of food are wasted every year throughout the supply chain. Every French citizen throws away 7 kg of food every year that is still in the original package (ADEME, 2010).

2.3.3 Environment: water scarcity, climate change and biodiversity loss

Water scarcity is the most critical development problem in the Mediterranean area and the single most important factor in limiting agricultural growth. Water availability in the region

has been declining steadily since the late 1950s. Water resources in the Mediterranean region, according to Plan Bleu, are limited, fragile and unevenly distributed (UNEP/MAP/ Plan Bleu, 2008).

The most critical situation is recorded in the Middle East and North Africa (MENA). Water demand has doubled during the second half of the 20th century to reach 280 billion m3 per year for all riparian countries in 2005. Agriculture is the main water-consuming sector and accounts for 64% of total water demand: 45% in the North and 82% in South and East. According to the projections of the Blue Plan baseline scenario, *water demand is increasingly met by an unsustainable water production* (UNEP/MAP/ Plan Bleu, 2008). Thus, improving the water demand management, water saving and rational water use, especially for agriculture, is of paramount importance for sustainability in the Mediterranean area.

According to the 4th IPCC report (IPCC, 2007), the Mediterranean is one of the regions of the world in which global warming will threat more environment and human activities (UNEP/MAP/Plan Bleu, 2008). Climate change is likely to affect agriculture and food security in the Region primarily through changes in temperature, precipitation, extreme climatic events and sea level rise (Skuras and Psaltopoulos, 2012). Climate change may result in such adverse effects as further deterioration of water scarcity, land degradation, crop failures, loss of rangeland and other vegetation covers, livestock deaths, and fisheries production and quality decline. Desertification is also a major threat to productivity in the South-Eastern Mediterranean countries. People in the dry areas mainly depend on agriculture and exploitation of natural resources for their livelihood and are hit hard by desertification. Of the 243 million hectares of agricultural land resources in the Mediterranean region 63% are located on the southern shores but only 39% are deemed to be arable land. This acreage is decreasing under the pressure of urbanisation and the rapid development of tourism, and soil quality is deteriorating due to the erosion of wind and rainfall, and the intensive use of irrigation.

Changes in the landscape and ecosystems have increased in recent decades, especially in the Mediterranean. The main pressure on these ecosystems and their biodiversity come from tourism, urban development in coastal areas, overfishing, intensive farming and irrigation, and the abandonment of traditional agricultural practices (Numa and Troya, 2011).

The Mediterranean basin is a major centre of plant diversity (Heywood, 1998), one of the eight centres of cultivated plant origin and diversity, with over 80 crops listed (Vavilov, 1951). The Mediterranean basin Biodiversity Hotspot (MBH) is the second largest hotspot in the world. The rich biodiversity of the Mediterranean terrestrial and marine flora and fauna, including many endemic species, is currently threatened by standardization of cultivation practices, monoculture, over exploitation of natural resources, mechanization, and changes in life styles that are affecting traditional production systems across the Mediterranean area and have reduced the spectrum of the biodiversity, particularly relevant in preparing healthy and nutritious food recipes at the base of the Mediterranean diet heritage.

Furthermore, indigenous knowledge on how to recognize, cultivate and use these local crops is also being lost at unprecedented rate. The genetic diversity of food crops and animal breeds is diminishing rapidly. In fact, at the beginning of the 21st century it is estimated that only 10% of the variety of crops that have been cultivated in the past are still being farmed, many local varieties being replaced by a small number of improved non-native varieties (Millstone and Lang, 2008).

The disappearance of ecological corridors and the homogenization of the natural mosaics are also threatening the survival and the reproduction of numerous wild species, many of direct economic importance (Zurayk, 2012). The loss of biodiversity in the Mediterranean area is strongly increasing in the last decade. In Italy just 2000 fruit tree varieties have survived out of the 8000 recorded at the end of 1800. Today, 1500 fruit varieties are threatened.

The loss of agricultural diversity occurring around the Mediterranean area could threaten the food security and livelihood of populations living in the region.

Many scientific assessments alert about the impacts of a thirty-year-old trend of the generalised exploitation of demersal stock that generated a gradual decline of fish resources and catches in the Mediterranean. For instance, there is overexploitation of groundfish as half of assessed stocks are being exploited beyond the limits of biological safety leading to dire consequences for stock survival. According to the latest evaluations carried out by the General Fisheries Commission for the Mediterranean (GFCM), while exploitation is moderate in the case of small pelagic, large pelagic, and in particular the blue-fin tuna, are in a critical situation. The stock of blue-fin tuna spawning adults is facing a serious risk of depletion. Swordfish are also subjected to large captures of juveniles (Plan Bleu, 2012).

2.3.4 Socio-cultural factors: homogenization of lifestyles and erosion of the Mediterranean diet cultural heritage

Food plays a central role in social and cultural life in the Mediterranean area which, therefore, is deeply influenced by the evolution of traditional values towards post-modern values as well as the globalised production system.

Changes in intergenerational relations and gender relations, the role of women in society and interrelations with the rest of the world (tourism and migrations) are having main effects on Mediterranean lifestyles and, consequently, on the westernization of food consumption patterns in the Mediterranean area. These changes are influenced to a large extent by: urbanization, organization of working time, growing participation of women in economic life, fewer household members, fewer generations living together, desocialization, collective environment (Padilla, 2008). With the spread of compulsory schooling the collective environment is gradually replacing the traditional family group, and this is happening at an increasingly early stage in people's lives. Young people's tastes are now formed for a large

part outside the family, in places where food is simplified and industrialized and rarely reflects Mediterranean traditions.

The population in the South is mainly young. By 2020, 36% of the population in the South will still be under 20 years of age compared to 20% in the North. It is a well known fact that young people who are going through the phase of a break between generations are more open to media influence and fashion trends and that they cultivate a certain degree of ambiguity between modern food which has a social identity appeal and traditional food (Padilla, 2008).

For all these factors, Mediterranean diet pattern is presently in decline among consumers because of standardization of lifestyles, loss of awareness and appreciation, particularly among younger generations about their own cultural food heritage.
Despite its increasing popularity worldwide, the Mediterranean diet, inscribed by UNESCO, in 2010, in the Representative List of Intangible Cultural Heritage of Humanity, is today endangered in all countries of the Mediterranean area. The abandonment of traditional healthy habits and the emergence of new lifestyles associated with socioeconomic changes pose important threats to the preservation and transmission of the Mediterranean diet to future generations (Dernini, 2011). The inscription of the Mediterranean Diet in the UNESCO Intangible Cultural Heritage List has put on the sustainability agenda, as a safeguarding measure, the utmost critical need of the inventory of this "intangible heritage". This inventory is both a complex process and indispensable tool in order to be able to value and decide what and how the intangible cultural heritage of the Mediterranean diet should be protected (Reguant-Aleix and Sensat, 2012).

2.4 Indicators

In the context of sustainable consumption and production (SCP), indicators can also indicate whether a society's consumption and production patterns are bringing about more socially equitable and environmentally sustainable development. In that regard, indicators of SCP are inextricably linked to broader sets of indicators on environment and sustainable development, including poverty reduction (UNEP, 2008).

A number of international organisations as well as a handful of governments have developed sets of indicators for SCP, mostly as part of wider ranging indicator sets for sustainable development (SD) but also as part, or in support of, dedicated SCP strategies (Watson *et al*, 2010). International organisations involved in the development of SCP Indicators and Indicator sets include the UNCSD, its Secretariat in UNDESA and the OECD. More recently UNEP has been involved in providing guidance for developing countries in developing SCP action plans including the development of a model SCP indicator framework for use by developing countries (UNEP, 2008). At the EU level the EU Sustainable Development Strategy required Eurostat to develop a set of Sustainable Development Indicators (SDI) and review and update this every two years.

According to the International Institute for Sustainable Development "*an indicator quantifies and simplifies phenomena and helps us understand complex realities* (IISD, 1997). According to the Organization for Economic Cooperation and Development**,** an indicator is "*a parameter, or a value derived from parameters, which points to, provides information about, or describes the state of a phenomenon/environment/area, with a significance extending beyond that directly associated with its value*" (OECD, 2003).
According to FAO, *an indicator does not reduce to the data on which it is based; it generally comprises elements (a cut-off value, a frame of reference, a mode of expression, etc.) which allow a relatively universal appreciation of the information it supplies and also facilitate comparison in time and space* (FAO, 2005)**.**

2.4.1 Criteria for selecting indicators

To select the most effective indicators, the following criteria were considered (Watson *et al,* 2010):
1. *Relevant to the question being asked.* The indicator should be the best indicator currently available to answer the question
2. *Understandable i.e.* clear, simple and unambiguous
3. *Graphically representable*
4. *Readily interpretable i.e.* clear which direction the indicator should develop to lead to greater sustainability
5. *Relevant* in most EEA Member and collaborating countries *i.e.* not restricted to an issue which is limited to a few member countries
6. *Monitorable i.e.* based on data that is readily available in member and collaborating countries, or could be made available at reasonable cost-benefit ratio and with regularity within time frame of policy cycle (i.e. updated each year and with maximum four year time delay)
7. *Reliable and consistent i.e.* data collection and analysis methodologies should preferably be consistent from country to country and at very least be consistent within a given country from year to year
8. *Representative i.e.* can be taken to represent current SCP trends within a given sector, final consumption cluster etc.

From a literature review (Maclaren, 1996) on social, environmental, health and sustainability indicators, the following criteria, commonly used in the process of selecting indicators, were also considered:

- Scientifically valid;
- Representative of broad range of conditions;
- Responsive to change;
- Relevant to the needs of potential users;
- Based on accurate accessible data;
- Based on data that are available over time;
- Understandable by potential users;
- Comparable with indicators developed in other jurisdictions;

- Cost-effective to collect;
- Attractive to the media; and
- Unambiguous.

In the identification process of the indicators considered relevant, as descriptive of the major issues related to the assessment of the Mediterranean diet's sustainability, the Bellagio sustainability assessment and measurement principles were also taken in consideration (IISD/OECD, 2009). In the identification process of the MD sustainability indicators, was also taken into account the set of indicators provided by the UK department for environment, food and rural affairs for enabling and encouraging people to eat a healthy, sustainable diet (DEFRA, 2009). Were also taken in consideration the sustainable development indicators used to monitor the EU sustainable development strategy (Eurostat, 2011).

2.4.2 Potential identified indicators

An initial set of indicators to assess the sustainability of the Mediterranean diets was identified at the CIHEAM International Workshop held in 2011 in Bari (table 1, for more details see annex 1).

Tab. 1. Potential indicators for assessing the sustainability of the Mediterranean diet, CIHEAM-Bari 2011.

	Pressure/ impact indicators	
Thematic areas	**Production**[2]	**Consumption**
Environment and natural resources (including agro-biodiversity)	- Water footprint - Carbon footprint - Ecological footprint - Energy efficiency	
	- Rate of biodiversity erosion[3] - Share of land under organic agriculture - Share of land under sustainable management[4] - Use of agro-chemicals (pesticides, fertilizers) - Number of CDO, PDO, PGI (food quality labels) - Resilience capacity of production systems - Change in arable land area - Change in aquatic resources - Share of area dedicated to urban and peri-urban agriculture. - Organic matter content (soil fertility) - Level of food processing - Carrying capacity - Number and acreage (ha) of GMO varieties	- Share of organic and eco-friendly food consumption - Food biodiversity consumption
Economy	- Degree of self sufficiency (trade balance) - Regional (sub-national) income - Employment - Availability of total supply (products from Mediterranean crops) - Volatility of prices and yields - Fair price /trade	
	- Land price - Economic impact of organic agriculture	- Food expenditure/weekly or monthly income[5] - Share of home food consumption on total consumption

[2] Includes processing and distribution.
[3] Food biodiversity inventory
[4] Biodiversity Indicators Partnership 2010, UNEP
[5] Household income and expenditure surveys.

	- Diversification of food production - Number/capacity of farm structures - Number of SME in agro-food	- Cost of obesity and non-communicable diseases (NCDs[6])
Society & Culture	- Number of traditional products still in use - Number of direct sale outlets and farmer markets - Social Life Cycle Analysis (LCA) index - Gender empowerment - Level of transmission of traditional knowledge to new generations - Number of socio-cultural events on Mediterranean food cultures - Number of training sessions related to Mediterranean food cultures[7] - Number of gastronomic tourism itineraries	
	- Degree of multifunctionality of agriculture - Level of salary of farm workers[8]	- Consumer perception and attitude towards MD - Number of consumer organizations - Level of active involvement of the young in MD promotion
Nutrition, health and lifestyle	- Share of diets that is locally produced - Household food security - Prevalence of obesity and non-communicable diseases[9] - Level of physical activity [10] - Burden of nutrition-related diseases	
	- Biodiversity and food composition. - Nutrient profile of foods - Food energy density - Level of food processing in the diet	- Mediterranean diet adherence scores and new Mediterranean diet pyramid - Number of young people adhering to the Mediterranean diet/ food consumption pattern[11]- Level of consumption of traditional foods and dishes - Share of eco-friendly and organic food consumption - Biodiversity in food consumption - Dietary diversity score (food choice) - Ratio fresh/ processed foods

[6] Cardiovascular disease, cancer, chronic lung diseases and diabetes.
[7] e.g. courses in schools and universities on nutrition, cooking, etc.
[8] Cf. emigrant workers.
[9] WHO (2011). Noncommunicable diseases country profiles 2011.
[10] WHO
[11] Disaggregated data: gender, age, etc.

		- Nutrient adequacy scores - Diet energy density - Nutritional anthropometry[12] - Biochemical measurements of nutritional status[13] - Adequate diet affordability[14] - Frugality - Time spent on food preparation - Time for rest/ sleep - Number of meals consumed with family (conviviality)

[12]Body measurements (height, weight, etc.).
[13] Anti-oxidants, fatty acids, blood measurements, etc.
[14] Minimum cost for meeting nutrient recommendations in a socially acceptable way

Then, through a series of meetings jointly conducted by CIHEAM MAI-Bari and FAO, with the participation of ENEA, INRAN, CNR, CIISCAM/Sapienza University of Rome, Bioversity International and WWF-Italy, held in Rome from January to June 2012, and through an online brainstorming process, held from June to September 2012, a second set of MD sustainability indicators, still under discussion, was identified together with a first outline of a methodology (Annex 2):

A. Nutrition and health indicators

A1. Diet-related morbidity/mortality statistics
A2. Fruit and vegetable consumption/intakes
A3.Vegetable/animal protein consumption ratios
A4. Dietary energy supply/intakes
A5. Dietary diversity score
A6. Dietary energy density score
A7. Nutrient density/quality score
A8. Food biodiversity composition and consumption
A9. Nutritional Anthropometry
A10. Physical activity/Physical inactivity prevalence

B. Environmental indicators

B1. Water footprint
B2. Carbon footprint
B3. Nitrogen footprint
B4. Biodiversity (to be determined)

C. Economic indicators

C1. Food consumer price index (FCPI): cereals, fruit, vegetables, fish and meat
C2. Cost of living index (COLI) related to food expenditures: cereals, fruit, vegetables, fish and meat
C3. Distribution of household expenditure groups: Food
C4. Food self-sufficiency: cereals, fruit, vegetables
C5. Intermediate consumption in the agricultural sector: nitrogen fertilizers
C6. Food losses and waste (to be determined)

D. Socio-cultural indicators

D1. Collective participation, cohesion, conviviality and commensality: Proportion of meals consumed outside home.
D2. Involvement of consumer in the preparation of food: Proportion of already prepared meals.
D3. Traditional diets relevance: Consumption of traditional products (e.g. Proportion of product under PDO (Protected Designation of Origin) or similar recognized traditional food.
D4. Transmission of knowledge: Mass media activities and products dedicated to traditional food. Proportion of mass media initiatives dedicated to the knowledge of food background cultural value.

The final identification of the MD sustainability indicators will allow to proceed with the proposed methodological approach presented in this discussion document finalized to produce a feasible framework for the development of country-based guidelines for improving the MD diets in the Mediterranean area.

3. Recommendations and proposals for enhancing the Mediterranean diets sustainability

An action program should envisage the implementation, in the 13 member countries of CIHEAM, of a three year pilot project to develop "*Guidelines for improving the sustainability of diets in the Mediterranean area*".

The Mediterranean diet, in its various national forms, should be used as a model to describe, understand and improve the sustainability of current Mediterranean food consumption patterns.

In order to measure the sustainability of food consumption a methodological approach and some potential indicators have been identified in this paper with the aim to contribute to formulate recommendations for cross-sectoral policy instruments allowing the improvement of the sustainability of the diets and food systems in the Mediterranean area.

The «Mediterranean Diet», recognized by UNESCO as an intangible heritage of humanity in 2010 could be considered as a model of sustainable diet in the Mediterranean basin, and able to contribute to the sustainability of the agro-food systems around the Mediterranean and to the valorisation of quality products.

As a result of these remarks, the attention of the Ministers of Agriculture of the 13 member countries of CIHEAM, who will meet on 27 September 2012, should be drawn particularly on the unsustainable situation of food systems around the Mediterranean affecting a large proportion of citizens who currently reside in the Southern and Northern Mediterranean, and on methods and strategies to be adopted to cope with it.

Actions to be undertaken in order to change this situation are urgent and represent the conditions to permanently change the observed processes and start new strategies for food security.

The sustainability of food systems, which represents an important area of reflection and action for governments and international organisations concerned about the serious socio-economic and environmental implications of short sighted behaviours and practices for agricultural land and rural communities.

The proposed methodological approach outlined in this paper might be useful for designing policies in order not only to conserve and preserve the Mediterranean diet, as a common cultural heritage and lifestyle, but also to enhance its sustainability.

That requires developing a set of comprehensive, coherent, integrated and holistic policies that deal with different spheres and arenas of nutrition, health, lifestyle, society, culture, economy, environment, and agro-biodiversity.

FAO and UNEP have formed in 2011 a joint Sustainable Food Systems Programme, within the 10 Year Framework of Programmes of the SCP, to improve the efficiency of resource use and reduce the intensity of pollution in food systems from production to consumption, while at the same time addressing issues of food and nutrition security. CIHEAM, in collaboration with the FAO/UNEP Sustainable Food Systems Programme, could play a lead role in identifying and catalyzing partnerships with other intergovernmental organizations, national governments, UN and EU agencies, private sectors and NGOs, to enhance the transition of the Mediterranean food systems towards a more efficient sustainable consumption and production pattern.

The methodological approach described in this paper may be useful for CIHEAM to develop, in cooperation with FAO, a medium term research and action framework to analyse the sustainability of the diets in the Mediterranean area, which could be considered a "pilot sustainability laboratory" because of the high and increasing pressure on its fragile natural resources exacerbated by the changes of Mediterranean food consumption patterns.

The results of the study can support Mediterranean governments and policy makers in the formulation of sustainability-sensitive policies in order not only to conserve and preserve the Mediterranean diet, as a common cultural heritage, but also to promote sustainable food systems development in the Mediterranean area.

References

AEA Technology Environment. (2005). The validity of food miles as an indicator of sustainable development. Final report for DEFRA. UK http://archive.defra.gov.uk/evidence/economics/foodfarm/reports/documents/foodmile.pdf

ADEME. (2010). Le gaspillage alimentaire au cœur de la campagne nationale grand public sur la réduction des déchets. Dossier de Presse, Paris.

American Dietetic Association, American Nurse Association, American Planning Association and American Health Association. (2010). Principles of a healthy, sustainable food system. www.planning.org/nationalcenters/health/pdf/HealthySustainableFoodSystemsPrinciples.pdf

American Public Health Association. (2007). Toward a healthy, sustainable food system. Policy statement. www.apha.org/advocacy/policy/policysearch/default.htm?id=1361

Babio N, Bullo M, Basora J, Martinez-Gonzalez MA, Fernandez-Ballart J, Marquez-Sandoval F et al. (2009). Adherence to the Mediterranean diet and risk of metabolic syndrome and its components. Nutr Metab Cardiovasc Dis; 19(8):563-570.

Bach A, Serra-Majem L, Carrasco JL, Roman B, Ngo J, Bertomeu I, Obrador B. (2006). The use of index evaluating the adherence to the Mediterranean diet in epidemiological studies: a review. Public Health Nutrition; 9(1A): 132-146.

Bach-Faig A, Berry EM, Lairon D, Reguant J, Trichopoulou A, Dernini S, Medina FX, Battino M, Miranda G, Serra-Majem L. (2011). Mediterranean Diet Pyramid Today. Science and Cultural Updates. Public Health Nutrition; 14(12A): 2274–2284.

Barilla Center for Food and Nutrition. (2010). Double Pyramid: Healthy food for people, sustainable food for the planet. Parma.

Baroni L, Cenci L, Tettamanti M, Berati M. (2007). Evaluating the environmental impact of various dietary patterns combined with different food production systems. Eur J Clin Nutr; 61(2):279-86.

Belahsen R, and Rguibi M. (2006). Population health and Mediterranean diet in southern Mediterranean countries. Public Health Nutrition; 9(8A):1130-5.

Bosetti C, Pelucchi C, La Vecchia C. (2009). Diet and cancer in Mediterranean countries: carbohydrates and fats. Public Health Nutrition; 12(9A):1595-600.

Buckland G, Bach A, Serra-Majem L. (2008). Obesity and the Mediterranean diet: a systematic review of observational and intervention studies. Obes. Rev; 9:582-593.

Buckland G, González CA, Agudo A, et al. (2009). Adherence to the Mediterranean diet and risk of coronary heart disease in the Spanish EPIC cohort study. Am. J. Epidemiol; 170(12):1518-29.

Burlingame B, and Dernini S. (2011). Sustainable diets: the Mediterranean diet example. Public Health Nutrition; 14(12A): 2285–2287.

Capone R, El Bilali H, Elferchichi A, Lamaddalena N, Lamberti L. (2012). Natural resources and food in the Mediterranean. In Mediterra 2012. CIHEAM–SciencesPo Les Presses, Paris; 171-193.

Carlsson-Kanyama A, and Gonzalez AD. (2009). Potential contributions of food consumption patterns to climate change. Am J Clin Nutr; 89 (suppl): 1704S-9S.

Carlsson-Kanyama A, Pipping Ekstrom M, Shanahan H. (2003). Food and life cycle energy inputs: consequences of diet and ways to increase efficiency. Ecological Economics; (44):293-307.

Carlsson-Kanyama A. (1998). Climate change and dietary choices – how can emissions of greenhouse gases from food consumption be reduced? Food Policy; (23):277-293.

CEPF. (2010). Ecosystem Profile - Mediterranean Basin Biodiversity Hotspot.

CIHEAM. (2012). MediTerra 2012 The Mediterranean Diet for sustainable regional development. CIHEAM–SciencesPo Les Presses, Paris.

CIHEAM. (2010). 8th Meeting of the CIHEAM Ministers of Food and Agriculture. Final Declaration. Istanbul. http://www.ciheam.org/images/CIHEAM/PDFs/Cooperation/final_declaration_istanbul_en.pdf

CIHEAM. (2008). MediTerra 2008. The future of agriculture and food in Mediterranean countries. CIHEAM–SciencesPo Les Presses, Paris.

CIISCAM. (2005). Call of Rome for a Common Action on Food in the Mediterranean. 3rd EuroMed Forum on Mediterranean Food Cultures, 2005, Rome.

www.ciiscam.org/files/download/documenti/02-PDF%20final%20Document%20Rome%20Call%202005.pdf
CIISCAM. (2009). The Mediterranean diet: a model of sustainable diet. 3rd CIISCAM International Conference, Parma. www.ciiscam.org/203/28/products/3rd_ciiscam_international_conference.html
Clonan A, and Holdsworth M. (2012). The challenge of eating a healthy and sustainable diet. Am J Clin Nutr; doi:10.3945/ajcn.112.044487
Da Silva R, Bach-Faig A, Raido Quintana B, Buckland G, Vaz de Almeida MD, Serra-Majem L. (2009). World variation of adherence to the Mediterranean diet, in 1961-1965 and 2000-2003.Public Health Nutrition; 12(9A):1676-1684.
DEFRA. (2011). Sustainable, secure and healthy food supply evidence plan 2011/12 http://www.defra.gov.uk/publications/files/pb13515-ep-food-supply.pdf
DEFRA. (2009). Indicators for a Sustainable Food System. Report UK. http://www.defra.gov.uk/statistics/files/defra-stats-foodsystemindicators.pdf
Delaney Burke J. (2012). Bridging the sustainability gap. Nutrition today; 47(4): 155-159.
de Lorgeril M, Renaud S, Mamelle N, et al. (1994). Mediterranean alpha-linolenic acid-rich diet in secondary prevention of coronary heart disease. (Erratum Lancet 1995; 345: 738). Lancet 343: 1454–1459.
Dernini S. (2011). The erosion and the renaissance of the Mediterranean diet: A sustainable cultural resource. Quaderns de la Mediterrania, IEMED, Barcelona; 16:75-82.
Dernini S, Berry E.M, Bach-Faig A, Belahsen R, Donini L.M, Lairon D, Serra-Majem L, Cannella C. (2012). Scientists reassess a dietary model: the Mediterranean diet. In, Mediterra 2012. CIHEAM–SciencesPo Les Presses, Paris; 71-88.
Duchin F. (2005). Sustainable consumption of food: A framework for analyzing scenarios about changes in diets. Journal of Industrial Ecology; 9(1-2):99-114.
EC/JRC. (2009). Environmental impacts of diet changes in the EU. Technical Report, European Commission (EC), Joint Research Centre (DG JRC), Institute for Prospective Technological Studies (IPTS).
Edwards-Jones G, Mila` i Canals L, Hounsome N, Truninger M, Koerber G, Hounsome B, Cross P, York EH, Hospido A, Plassmann K, Harris IM, Edwards RT, Day GAS, A. Tomos D, Cowell SJ, Jones DL. (2008). Testing the assertion that 'local food is best': the challenges of an evidence-based approach. Trends in Food Science & Technology; 19: 265-274.
Esnouf, C, Russel M, Bricas N. (Eds), 2011. duALIne – durabilité de l'alimentation face à de nouveaux enjeux. Questions à la recherché, Rapport Inra-Cirad (France).
Estruch R, Martínez-González MA, Corella D, Salas-Salvado J, Ruiz-Gutierrez V, Covas MI, Fiol M, Gomez-Gracia E, Lopez-Sabater MC, Vinyoles E, Aros F, Conde M, Lahoz C, Lapetra J, Saez G, Ros E, Premided Study Investigators. (2006). Effects of a Mediterarrean-style Diet on Cardiovascular Risk Factors: A Randomized Trial. Annals of Internal Medicine; 45: 1-11.
Eurostat. (2011). Sustainable development indicators. Theme 2: Sustainable Consumption and Production. http://epp.eurostat.ec.europa.eu/portal/page/portal/sdi/indicators/theme2.
FAO. (2012a). 31st Regional Conference for the Near East. Report. Rome
FAO. (2012b). 31st Regional Conference for the Near East. Food loss prevention for improving food security in the Near East. Rome
FAO/Bioversity. (2012c). Sustainable Diets and Bioversity. Directions and Solutions for Policy, Research and Action. Rome. http://www.fao.org/docrep/016/i3004e/i3004e00.htm
FAO. (2012d). Greening the economy with agriculture. Working paper 4: utilization. Improving food systems for sustainable diets in a green economy. www.fao.org/docrep/015/i2745e/i2745e00.pdf
FAO. (2011a). Regional Priority Framework For The Near East. FAO Regional Office for the Near East, Cairo.
FAO. (2011b). Global food losses and food waste. Extent, causes and prevention. Rome.
FAO. (2011c). The State of World Fisheries and Aquaculture 2010. Rome.
FAO.(2011d). Global food price monitor - Highlights. Rome.
FAO/Bioversity. (2010). Report of the international symposium on Biodiversity and Sustainable Diets. Rome. http://www.fao.org/ag/humannutrition/28506-0efe4aed57af34e2dbb8dc578d465df8b.pdf

FAO. (2010). Report of the technical workshop on Biodiversity in Sustainable Diets. Rome. http://www.fao.org/ag/humannutrition/24994-064a7cf9328fbe211363424ba7796919a.pdf
FAO. (2009a). The State of Food and Agriculture—Livestock in the Balance, FAO, Rome.
FAO. (2009b). Linking people, places and products. A guide for promoting quality linked to geographical origin and sustainable Geographical Indications. FAO/SINER-GI, Rome.
FAO. (2008). 26th Regional Conference for Europe. Innsbruck.
FAO. (2005). Nutrition indicators for development. Rome. http://www.fao.org/docrep/008/y5773e/y5773e00.htm
FAO. (2004). 24th Regional Conference for Europe. Item Six – Food safety and quality in Europe: Aspects concerning in particular quality, nutritional balance, the importance of agricultural land and cultural heritage ("Terroirs"). Montpellier.
Fidanza F, Alberti A, Lanti M, Menotti A. (2004). Mediterranean Adequacy Index: correlation with 25-year mortality from coronary heart disease in the Seven Countries Study. Nut Metab Cardiovasc Dis; 14254-258.
Florensa S, and Aragall X. (2012). Mutations in Mediterranean societies. In Mediterra 2012. CIHEAM–SciencesPo Les Presses, Paris; 91-113.
Garnett T. (2011). Where are the best opportunities for reducing greenhouse gas emissions in the food system (including the food chain)? Food Policy; 36:s23-s32.
Garcia-Closas R, Berenguer A, Carlos A Gonzalez C. (2006). Changes in food supply in Mediterranean countries from 1961 to 2001. Public Health Nutrition; 9(1):53-60.
Gerbens-Leenes W, and Nonhebel S. (2005). Food and land use. The influence of consumption patterns on the use of agricultural resources. Appetite; 45:24-31.
Gerber M. (2006). Qualitative methods to evaluate Mediterranean diet in adults. Public Health Nutr; 9(1A):147-51.
Godfray HCJ, Beddington JR, Crute IR, Haddad L, Lawrence D, Muir JF, Pretty J, Robinson S, Thomas SM, Toulmin C. (2010). Food security: the challenge of feeding 9 billion people. Science; 327: 812-818.
González Turmo I. (2012). The Mediterranean diet: consumption, cuisine and food habits. In Mediterra 2012. CIHEAM–SciencesPo Les Presses, Paris; 115-132.
Gussow JD. (1995). Mediterranean diets: are they environmentally responsible? Am J Clin Nutr; 61(suppl):1383S-9S.
Gussow JD, and Clancy K. (1986). Dietary guidelines for sustainability. Journal Nutrition Education; 18(1):1-5.
Guyomard H, Darcy-Vrillon B, Esnouf C, Marin M, Momot A, Russel M, Guillou M. (2011). Eating patterns and food systems: critical knowledge requirements for policy design and implementation. INRA. Document prepared for the Commission on Sustainable Agriculture and Climate Change. http://ccafs.cgiar.org/sites/default/files/assets/docs/guyomard_et_al_eating_patterns_and_food_systems.pdf
Haines A, McMichael A, Smith K, Roberts J, Woodcock J, Markandya A, Armstrong BG, Campbell-Lendrum D, Dangour AD, Davies M, Bruce N, Tonne C, Barrett M, Wilkinson P. (2009). Public health benefits of strategies to reduce greenhouse-gas emissions: overview and implications for policy makers. The Lancet; 374(9707):2104-2114
Hawkesworth S, Dangour AD, Johnston D, Lock K, Poole N, Rushton J, Uauy R, Waage J. (2010). Feeding the world healthily: the challenge of measuring the effects of agriculture on health. Philosophical Transactions of the Royal Society, B- Biological Sciences; 365:3083-3097.
Heinrich M, Müller WE, Galli C. (eds.). (2006). Local Mediterranean food plants and nutraceuticals. Karger, Basle.
Heywood VH. (1998). The Mediterranean region. A major centre of plant diversity. In: (Heywood VH, Skoula M eds) "Wild food and non-food plants: information networking". Proceedings of the II MEDUSA Regional Workshop (1-3 may 1997, Port El-Kantaoui, Tunisia). Cahiers CIHEAM, Options Méditerranéennes; 38:5-15.
HLPE. (2011). Price volatility and food security. A report by the High Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security, Rome
Holdsworth M. (2010). Sustainability should be integral to nutrition and dietetics. J Hum Nutr Diet;

IISD. (1997). Assessing Sustainable Development – Principles in Practice. International Institute for Sustainable Development, Winnipeg, Canada. http://www.nssd.net/pdf/bellagio.pdf.

IISD/OECD. (2009). BellagioSTAMP: Sustainability assessment and measurement principles. The International Institute for Sustainable Development/The Organisation for Economic Co-operation and Development; Winnipeg, Manitoba.

IOTF. (2005). EU platform on diet, physical activity and health. Briefing paper. International Association for the Study of Obesity, London, UK. http://ec.europa.eu/health/ph_determinants/life_style/nutrition/documents/iotf_en.pdf

IPCC. (2007). Fourth Assessment Report. Climate change 2007: synthesis report. Intergovernmental Panel on Climate Change. Valencia, Spain.

ITFPCHD. (2000). Consensus statement: dietary fat, the Mediterranean diet and lifelong good health. International Task Force for Prevention of Coronary Heart Disease www.chd-taskforce.com/2000consensusstatement/index_e.htm.

Issa C, Darmon N, Salameh P, Maillot M, Batal M, Lairon D. (2011). A Mediterranean diet pattern with low consumption of liquid sweets and refined cereals is negatively associated with adiposity in aduls from rural Lebanon. Int.J.Obes; 35(2):251-8.

Kastner T, Rivas MJI, Koch W, Nonhebel S. (2012). Global changes in diets and the conseguences for land requirements for food. Proceedings of the National Academy of Sciences; 109(18): 6868-6872.

Kastorini CM, Milionis HJ, Esposito K, Giugliano D, Goudevenos JA, Panagiotakos DB. (2011). The effect of Mediterranean diet on metabolic syndrome and its components a meta-analysis of 50 studies and 534,906 individuals. J Am Coll Cardiol; 57(11):1299-1313.

Kearney J. (2010). Food consumption trends and drivers. Phil. Trans. R. Soc; 365:2793-2807.

Kesse-Guyot E, Fezeu L, Hercberg S, Ahluwalia N, Lairon D. (2012). Adherence to Mediterranean diet reduces the risk of metabolic syndrome: a prospective study. Nutr Metab Cardiovasc Dis;142(5):909-15.

Keys AB. Ed. (1970). Coronary heart disease in seven countries. Circulation; 51-52 (1 Suppl.).

Keys AB and Keys M. Eds. (1975). How to Eat Well and Stay Well the Mediterranean Way. Doubleday.

Keys AB. Ed. (1980). Seven countries: a multivariate analysis of death and coronary heart disease. Harvard University Press.

Kissinger M. (2012). International trade related food miles – The case of Canada. Food Policy; 37:171-178.

Kromhout D, Keys A, Aravanis C, Buzina R, Fidanza F, Giampaoli S, Jansen A, Menotti A, Nedeljkovic S, Pekkarinen M, et al.(1989). Food consumption patterns in the 1960s in seven countries. Am J Clin Nutr; 49(5): 889-94 Lacirignola C and Capone R. (2010). Rethinking the Mediterranean diet for the 21st century. The CIHEAM Watch letter; 13:1-5.

Lairon D. (2007). Intervention studies on Mediterranean diet and cardiovascular risk. Mol Nutr Food Res; 51:1209-1214.

La Vecchia C.(2004). Mediterranean diet and cancer. Public Health Nutr; 7(7):965-8.

León-Muñoz LM, Guallar-Castillón P, Graciani A, López-García E, Mesas AE, Aguilera MT, Banegas JR, Rodríguez-Artalejo F. (2012). Adherence to the Mediterranean diet pattern has declined in Spanish adults. Journal of Nutrition; doi: 10.3945/jn.112.164616.

Lock K, Smith DR, Dangour AD, Keogh-Brown M, Pigatto G, Hawkes C, Fisberg RM, Chalabi Z. (2010). Health, agricultural, and economic effects of adoption of healthy diet recommendations. The Lancet; (376):1699-1709.

Lundqvist J, de Fraiture C, Molden D. (2008). Saving Water: From Field to Fork – Curbing Losses and Wastage in the Food Chain. SIWI Policy Brief, Stockholm International Water Institute (SIWI), Stockholm.

Lupo A. (1997). Nutrition in general practice in Italy. Am J Clin Nutr; 65(Suppl 6):1963S–1966S.

Macdiarmid JI, Kyle J, Horgan GW, Loe J, Fyfe C, Johnstone A, McNeil G. (2012). Sustainable diets for the future: can we contribute to reducing greenhouse gas emissions by eating a healthy diet? Am J Clin Nutr; doi: 10.3945/ajcn.112.038729.

Maclaren VW. (1996). Developing Indicators of Urban Sustainability: A Focus on the Canadian Experience. ICURR Press, Toronto.

Maillot M, Issa C, Vieux F, Lairon D, Darmon N. (2011). The shortest way to reach nutritional goals is to adopt Mediterranean food choices. Evidence from computer-generated personalized diets. Am J Clin Nutr; 94(4):1127-37.

Manios Y, Detopoulou V, Visioli F, Galli C. (2006). Mediterranean Diet as a Nutrition Education and Dietary Guide: Misconceptions and the Neglected Role of Locally Consumed Foods and Wild Green Plants. In M. Heinrich, W.E. Müller & C. Galli (eds.) Local Mediterranean food plants and nutraceuticals, Karger, Basle;154-170.

Marlow JH, Hayes WK, Soret S, Carter RL, Schwab RE, Sabate'J. (2009). Diet and the environment: does what you eat matter? Am J Clin Nutr; 89(suppl):1699s-703.

Martinez-Gonzalez MA, Bes-Rastrollo M, Serra-Majem L, Lairon D, Estruch R, Trichopoulou A. (2009). Mediterranean food pattern and the primary prevention of chronic disease: recent developments. Nutr Rev; 67 Suppl 1:S111-6.

Martinez-Gonzalez MA, Fuente-Arrillaga C, Nunez-Cordoba JM, Basterra-Gortari FJ, Beunza JJ, Vazquez Z et al. (2008). Adherence to Mediterranean diet and risk of developing diabetes: prospective cohort study. BMJ; 336(7657):1348-1351.

Martinez-Gonzalez MA, Fernandez-Jarne E, Serrano-Martinez M, et al. (2002). Mediterranean diet and reduction in the risk of a first acute myocardial infarcton. An operational healthy dietary score. Eur J Nutr; 41: 153–160.

Mendez MA, Popkin BM, Jakszyn P, Berenguer A, Tormo MJ, Sanchez MJ, Quiros JR, Pera G, Navarro C, Martinez C, Larranaga N, Dorronsoro M, Chirlaque MD, Barricarte A, Ardanaz E, Amiano P, Agudo A, Gonzalez CA. (2006). Adherence to a Mediterranean Diet is Associated with Reduced 3-year Incidence of Obesity. Journal of Nutrition; 136:2934-2938.

Menotti A, Kromhout D, Blackburn H, Fidanza F, Buzina R, Nissinen A. (1999). Food intake patterns and 25-year mortality from coronary heart disease: cross-cultural correlations in the Seven Countries Study. The Seven Countries Study Research Group. Eur J Epidemiol;15(6):507-15.

Millstone E, and Lang T. (2008). The Atlas of Food. Earthscan, second edition, London.

Mittermeier RA, Brooks T, Da Fonseca GAB, Gil PR, Hoffmann M, Lamoreux J, Mittermeier CG, Pilgrim J. (2004). Hotspots Revisited: Earth's Biologically Richest and Most Endangered Terrestrial Ecoregions. University of Chicago Press for Conservation International. Chicago.

Nestle M. (1995). Mediterranean diets: historical and research overview. American Journal Clinical Nutrition; 61(suppl.):1313S-20S.

Numa C, and Troya A. (2011). The challenge for biodiversity conservation in the Mediterranean. IEMED Mediterranean Year Book 2011; 255-260

OECD. (2003). Environmental Indicators – Development, Measurement and Use. Organisation for Economic Cooperation and Development Reference Paper.

O'Kane G. (2012). What is the real cost of our food? Implications for the environment, society and public health nutrition. Public Health Nutrition; 15(02):268-276.

Padilla M, Capone R, Palma G. (2012). Sustainability of the food chain from field to plate: case of the Mediterranean diet. In "Sustainable diets and biodiversity: United against hunger. FAO/Bioversity International", Rome; 230-241.

Padilla M. (2008). Dietary patterns and trends in consumption. In, Mediterra 2008: The future of agriculture and food in Mediterranean countries.CIHEAM–Presses de Sciences Po. Paris;149-170.

Panagiotakos DB, Chrysohoou C, Pitsavos C, Stefanadis C. (2006). Association between the Prevalence of Obesity and Adherence to the Mediterranean Diet: the ATTICA Study. Nutrition; 22:449-456.

Pimentel D, and Pimentel M. (2003). Sustainability of meat-based and plant-based diets and the environment. Am J Clin Nutr; 78(3):660s-663s.

Plan Bleu. (2012). 20 Years of sustainable development in the Mediterranean: review and outlook.Blue Plan Notes; 22. Available at: http://www.planbleu.org/publications/8p22_20ans_dd_EN.pdf

Pluimers J, and Blonk H. (2011). Methods for quantifying the environmental and health impacts of food consumption patterns. Blonk Milieuadvies, PJ Gouda, The Netherlands

Reguant-Aleix J. and Sensat F. (2012). The Mediterranean diet, intangible cultural heritage of humanity. In, Mediterra 2012. CIHEAM–SciencesPo Les Presses, Paris; 465-484.

Renault D, and Wallender WW. (2000). Nutritional water productivity and diets. Agricultural Water Management; 45: 275-296.

Sánchez-Villegas A, Bes-Rastrollo M, Martínez-González MA, Serra-Majem L. (2006). Adherence to a Mediterranean Dietary Pattern and Weight Gain in a Follow-up Study: the SUN Cohort. International Journal of Obesity; 30:350-358.

Sánchez-Villegas A, Delgado-Rodriguez M, Martínez-González MA, De Irala-Estevez J. (2003). Gender, Age, Socio-demographic and Lifestyle Factors Associated with Major Dietary Patterns in the Spanish Project SUN. European Journal of Clinical Nutrition; 57:285-292.

Serra-Majem L, Bes-Rastrollo M, Roman-Vinas B, Pfrimer K, Sanchez-Villegas A, Martinez-Gonzalez MA. (2009). Dietary patterns and nutritional adequacy in a Mediterranean country. Br.J Nutr;101 Suppl 2:S21-S28.

Serra-Majem L, Roman B, Estruch R. (2006). Scientific evidence of interventions using the Mediterranean diet: a systematic review. Nutrition Review; 64:S27-S47.

Serra-Majem L, Ribas L, Ngo J, Mortega R, Garcıa A, Perez-Rodrigo C, Aranceta J. (2004). Food, youth and the Mediterranean diet in Spain. Development of KIDMED, Mediterranean Diet Quality Index in children and adolescents. Public Health Nutrition; 7(7): 931–935.

Serra-Majem L, Trichopoulou A, Ngo J, de la Cruz J, Cervera P, García Álvarez A, La Vecchia C, Lemtouni A, Trichopoulos D. (2004a). Does the definition of the Mediterranean Diet need to be updated ?" Public Health Nutrition; 07:927-929.

Sim S, Barry M, Clift R, Cowell S. (2007). The relative importance of transport in determining an appropriate sustainability strategy for food sourcing. Int J LCA; 12(6): 422-431.

Sinha R, Cross A, Graubard B, Leitzmann M, Schatzkin A. (2009). Meat intake and mortality: a prospective study of over half a million people. Archive of Internal Medicine, 169 (6):562-571.

Sofi F, Cesari F, Abbate R, Gensini A. (2008). Adherence to Mediterranean diet and health. BMJ; 337:1136-1344.

Steinfeld H, Castel V, Gerber P, de Haan C, Rosales M., Wassenaar T. (2006). Livestock's Long Shadow: Environmental Issues and Options, FAO, Rome.

SDC. (2011). Looking back, looking forward. Sustainability and UK food policy 2000-2011. Sustainable Development Commission. UK.

SDC. (2009). Setting the table - Advice to Government on priority elements of sustainable diets. Sustainable Development Commission. UK.
http://www.sd-commission.org.uk/data/files/publications/Setting_the_Table.pdf

Skuras D, and Psaltopoulos D. (2012). A broad overview of the main problems derived from climate change that will affect agricultural production in the Mediterranean area. FAO/OECD Workshop: Building Resilience for Adaptation to Climate Change in the Agriculture Sector, 23-24 April 2012, Rome
http://www.sd-commission.org.uk/data/files/publications/FoodPolicy10_Report_final_w.pdf

Tortosa A, Bes-Rastrollo M, Sanchez-Villegas A, Basterra-Gortari FJ, Nunez-Cordoba JM, Martinez-Gonzalez MA. (2007). Mediterranean diet inversely associated with the incidence of metabolic syndrome: the SUN prospective cohort. Diabetes Care; 30(11):2957-2959.

Trichopoulou A. (2004). Traditional Mediterranean diet and longevity in the elderly: a review. Public Health Nutr; 7, 943–947.

Trichopoulou A, Bamia C, Trichopoulos D. (2009). Anatomy of health effects of Mediterranean diet: Greek EPIC prospective cohort study. BMJ; 338:b2337.

Trichopoulou A, Bamia C, Trichopoulos D. (2005). Mediterranean diet and survival among patients with coronary hearth disease in Greece. Arch Intern Med; 25;165(8):929-35.

Trichopoulou A, Costacou T, Bamia C, Trichopoulos D. (2003). Adherence to a Mediterranean diet and survival in a Greek population. N Engl J Med; 348: 2599-2608.

Trichopoulou A, Kouris-Blazos A, Wahlqvist ML, Gnardellis C, Lagiou P, Polychronopoulos E, Vassilakou T, Lipworth L, Trichopoulos D. (1995). Diet and overall survival in elderly people. BMJ; 311:1457-1460.

Trichopoulou A, and Lagiou P. (1997). Healthy traditional Mediterranean diet: an expression of culture, history, and lifestyle. Nutrition Reviews; (55), 383–389.

UN. (2003). Indicator for Monitoring the Millennium Development Goals. New York. http://mdgs.un.org/unsd/mdg/Resources/Attach/Indicators/HandbookEnglish.pdf

UNCSD. (2012). Rio+20 United Nations Conference on Sustainable Development. The future we want. Outcome of the Conference. www.uncsd2012.org/rio20/thefuturewewant.html

UNEP. (2012a). The Critical role of global food consumption patterns in achieving sustainable food systems and food for all. Discussion paper. www.unep.fr/scp/agrifood/pdf/Role_of_Global_Food_Consumption_Patterns_A_UNEP_Discussion_Paper.pdf

UNEP. (2012b). Avoiding Future Famines: Strengthening the Ecological Foundation of Food Security through Sustainable Food Systems. Synthesis report. www.unep.org/publications/ebooks/avoidingfamines/portals/19/Avoiding_Future_Famines.pdf

UNEP. (2008). SCP Indicators for Developing Countries - A Guidance Framewok http://www.unep.fr/scp/publications/details.asp?id=DTI/1085/PA

UNEP/MAP/Plan Bleu. (2011). Mediterranean Strategy For Sustainable Development Follow Up: Main Indicators. Sophia Antipolis, France.

UNEP/MAP/Plan Bleu. (2010). Economic Evaluation of Water Demand Management in the Mediterranean. *Study report*. Sophia Antipolis, France.

UNEP/MAP/Plan Bleu. (2008). The Blue Plan's sustainable development outlook for the Mediterranean. Sophia Antipolis, France.

UNEP/MAP/Plan Bleu. (2006). A Sustainable Future for the Mediterranean. The Blue Plan's Environment and Development Outlook. Executive Summary. Sophia Antipolis, France. http://www.planbleu.org/red/pdf/red_resume_uk.pdf

UNEP/MAP. (2005). Mediterranean Strategy For Sustainable Development: A Framework for Environmental Sustainability and Shared Prosperity. Tenth Meeting of the Mediterranean Commission on Sustainable Development (MCSD), Athens.

UNESCO. (2010). Representative List of the Intangible Cultural Heritage of Humanity. www.unesco.org/culture/ich/index.php?lg=en&pg=00011&RL=00394

UNSCN. (2012). Nutrition security of urban populations, Statement. http://www.unscn.org/files/Statements/August_31-_UNSCN_World_Urban_Forum_6-_Statement_final_3108_finalfinal.pdf

Vareiro D, Bach-Faig A, Raidó Quintana B, Bertomeu I, Buckland G, Vaz de Almeida MD, Serra-Majem L. (2009). Availability of Mediterranean and non-Mediterranean foods during the last four decades: comparison of several geographical areas.Public Health Nutrition;12(9A):1667-75.

Vavilov NJ. (1951). Phytogeographic basis of plant breeding - The origin, variation, immunity and breeding of cultivated plants. Chronica Bot; 13: 1-366.

Vernele L, Bach-Faig A, Buckland G, Serra-Majem L. (2010). Association between the Mediterranean diet and cancer risk: a review of observational studies. Nutrition and Cancer; 62(7): 860–870.

Vieux F, Darmon N, Touazi D, Soler LG. (2012). Greenhouse gas emissions of self-selected individual diets in France: changing the diet structure or consuming less? Ecological Economics; 75:91-101.

Watson D, Lorenz U, Hansen MSt, Szlezak J, Zoboli R, Kuhndt M, Wilson C, Mont O, Wittmer D. (2010). Towards a Set of Indicators on Sustainable Consumption and Production (SCP) for EEA reporting. European Topic Centre on Sustainable Consumption and Production (ETC/SCP), Copenhagen.

Weber CL, and Matthews SH. (2008). Food-miles and the relative climate impacts of food choices in the United States. Environmental Science & Technology; 42(10):3508-3513.

Willett WC, Sacks F, Trichopoulou A, Drescher G, Ferro-Luzzi A, Helsing E, Trichopoulou D. (1995). Mediterranean diet pyramid: a cultural model for healthy eating. Am J Clin Nutr; 61 (suppl):1402S-1406S.

WHO. (2011). Non communicable diseases country profiles 2011. Global report. http://www.who.int/nmh/publications/ncd_profiles2011/en/index.htmlWHO. (2006). Addressing the socioeconomic determinants of healthy eating habits and physical activity levels among adolescents. WHO/HBSC forum. http://www.euro.who.int/document/e89375.pdf

WHO. (2005). Diet, nutrition and the prevention of chronic diseases. Report of a Joint WHO/FAO Expert Consultation. http://whqlibdoc.who.int/trs/who_trs_916.pdf

WWF. (2011). Livewell: a balance of healthy and sustainable food choices. UK. http://assets.wwf.org.uk/downloads/livewell_report_corrected.pdf

Zazpe I, Bes-Rastrollo M, Ruiz-Canela M, Sánchez-Villegas A, Serrano-Martínez M, Angel Martínez-González M. (2011). A bried assessment of eating habits and weight gain in a Mediterranean cohort. Br J Nutr;105(5):765-75.

Zurayk R. (2012). Can sustainable consumption protect the mediterranean landscape?. In Mediterra 2012. CIHEAM–SciencesPo Les Presses, Paris; 155-193.

Annex 1.
Final Declaration of the 9th Meeting of the Ministers for Food, Agriculture and Fisheries of the Member Countries of CIHEAM, 27 September 2012, Valetta, Malta

9TH MEETING OF THE MINISTERS FOR FOOD, AGRICULTURE AND FISHERIES of THE MEMBER COUNTRIES OF CIHEAM

Valetta, 27 September 2012

FINAL DECLARATION

At the invitation of the Hon. George Pullicino, Minister for Resources and Rural Affairs of Malta, the Ministers of Agriculture, or their representatives, of the 13 member states of the International Centre for Advanced Mediterranean Agronomic Studies (CIHEAM), met in Valletta on 27 September, 2012, the year in which CIHEAM celebrates its 50th anniversary since its inception.

The Ministers and Heads of Delegation wish to emphasize the importance of this intergovernmental organization and acknowledge its contribution to education, research and cooperation in the Mediterranean;

The Ministers and the Heads of Delegation

- aware that the original configuration of CIHEAM offers an appropriate framework for the identification of mutual interests in agriculture and rural development, food security and the sustainable management of natural resources at a time when the Mediterranean region is witnessing a period of political, social, economic and environmental transition;

- considering that, for the stability of CIHEAM Nations, agriculture and food are strategic issues for the prosperity and for the daily well-being of the population, and that all forms of sustainable agriculture are necessary to meet the challenge of global food security, without overlooking the contributions of the aquaculture and forestry sectors;

- aware that the requirements of food security in the Mediterranean must be seen in a context of multiple challenges (geographical constraints including water and land scarcity, demographic growth and urbanisation, climatic changes and environmental threats) and calls for more multilateral cooperation and regional solidarity among Mediterranean countries to face these challenges, as has been analyzed in the numerous studies conducted by CIHEAM (i.a. Mediterra reports) and recommended at previous meetings of the Ministers of Agriculture of the 13 member states;

- considering the observations made, the different recommendations submitted, and the overall measures deliberated in particular on food security and the struggle against the volatility of agricultural commodities prices in international fora, particularly within the FAO, (Rome summit - November 2009), the G8 (Aquila summit - July 2009) and the G20 (Cannes summit - November 2011), and more recently at the 5+5 Dialogue in the western Mediterranean (Algiers Seminar - February 2012) and United Nations Conference on Sustainable Development called 'Rio+20' (Rio de Janeiro summit – June 2012);

- aware of the trend for the prices of basic commodities to increase and that the dependence of the majority of the Mediterranean countries on the international markets could intensify in the future, and that trade and exchanges through partnership will contribute to guarantee regular supplies;

- taking cognizance of the discussions which took place in Malta, on the 25th and 26th September 2012 during the International Seminar on the Sustainability of Agro-alimentary Systems in the Mediterranean, organized by CIHEAM with the collaboration of the Maltese authorities, and underlining the role of the Mediterranean diet as a driver of sustainable food systems within the strategies of regional development and on that of traditional local products, since quantitative food security must also be complemented by qualitative approaches;

Dedicated their deliberations on joint actions to consider "food security and food price volatility within the countries of the Mediterranean", convinced that this topic is central to the key political, economic, social and ecological policy issues of the region.

At the end of their debates, the Ministers and Heads of Delegation submitted recommendations to: (i) Mediterranean countries: (ii) to international organizations operating in the Mediterranean region (iii) and to CIHEAM.

It is for Mediterranean countries to

1) (i) Implement national agricultural and rural development policies as well as ecologically and socially responsible food strategies, in order to reinforce food security for their citizens, /while supporting agricultural producers (ii) Encourage a more inclusive growth on their territories - notably in remote regions while stimulating local governance, (iii) Pursue adaptation efforts for climate change in agriculture, (iv) Develop innovative public-private financing and risk -management tools in agriculture and (v) Place agriculture among the main political priorities while fostering public opinion on the strategic role of this sector for the future ;

2) Recognize in these policies the essential role of

- Small-scale farmers, providing consistent support to these groups' activities, while strengthening their access to local, national and regional markets, providing them with mechanisms to meet production and income risks and developing employment strategies capable of making agricultural jobs and the rural economy more attractive; and

- Women and young farmers in the same manner

3) Share the concerns, information and the national experiences concerning food security in order to progressively elaborate concrete and sustainable regional projects; and relying on these inputs towards Mediterranean cooperation and research networks to formulate such concerted initiatives and to disseminate the expertise so acquired at regional level, this trough projects related to sustainable rural development, to the development and promotion of quality products and the coordination of agricultural research on topics such as water stress resistant plant species and water resources management;

4) Develop agricultural and logistical complementary opportunities among the Mediterranean countries on the level of commercial exchanges, to foster growth in

investments in infrastructure and transport and promote further joint ventures, while noting that efforts against inefficiency and wastage contribute towards re-enforcing food security.

5) Contribute to the development of a market information system of the Mediterranean countries, linked to AMIS, in close collaboration with the G20 monitoring panel, as a way to share sound information in order to help prevent price volatility in agricultural markets.

6) Contribute to back CIHEAM, an organisation that since its creation in 1962 has made every effort in building up human capacity, support scientific research and the development of Mediterranean relationships on the essential themes of agriculture, food and the environment, and to reinforce this unique multilateral cooperation instrument while projecting its actions toward the large regional issues and upcoming challenges, notably the improving of food security;

To the International and Regional Organizations that the

1) European Union may pursue, within the setting of its neighbourhood policies, cooperation in the Mediterranean area while attributing an important place to agricultural and rural development contained in the new ENPARD programme.

2) European Union could strengthen the CIHEAM mission in the Mediterranean, also through the use of delegated cooperation tools foreseen for international organisations.

3) Secretariat of the Union for the Mediterranean supports the projects concerning food security considering its vocation to promote Euro-Mediterranean multilateral actions, identifying initiatives in this sector which affects the daily lives of the population and constitutes an area for solidarity.

4) Different international institutions responsible for cooperation in the Mediterranean or for food security, may, by allying themselves with CIHEAM, synergise training and research programmes, for development projects and sustainable management of natural resources pooling together regional human and financial resources and tackling food tensions, while involving the private sector, foundations and non-Mediterranean countries anxious to play a role in the stability and the development of the Mediterranean region.

5) International Organizations give its support to the implementation of the recommendations formulated during the International Seminar on the Sustainability of Agro-alimentary Systems in the Mediterranean, the findings of which are annexed to the present declaration.

To CIHEAM that it

1) Consolidates and strengthen the experience of half a century of existence while adapting to new regional realities and cultivating the organization's mission for

Mediterranean cooperation and knowledge-sharing, intercultural dialogue and training within the frameworks of tomorrow ;

2) Continues its mission of observation, education and cooperation while developing its activities on food security at all levels (local, national, regional), and endeavours to propose innovative educational courses and so contribute to the strengthening of institutional capacities, thus establishing new guidelines adapted to the requirements of the region, while exploring new fields of expertise to promote a holistic vision of agriculture and food;

3) Support Mediterranean countries in the development of a market information system of the Mediterranean countries, linked to AMIS, in close collaboration with the G20 monitoring panel in collaboration with FAO, and to make use of its expertise and specialisation to reinforce the capacity building of the countries.;

4) Sustains the establishment of a Euro-Mediterranean network on food security bringing together civil servants, experts, entrepreneurs and producer organizations of the countries wishing to adhere to this programme, share knowledge, promote common actions at a regional level and form a group of regular contacts in this field

5) Commit to work for small-scale farmers, as recommended above, in connection with the High Level Panel of Experts (HPLE) on food security an nutrition that has been created to advise the FAO's Committee on World Food Security (CFS);

6) Sustains sharing and exchange of good practices on producer organizations and risk management;

7) Pursues its committed action, comprising the improvement of responsible management for natural resources in the region, notably water in the domain of irrigation, an essential pillar of food security strategies for training, research and development aid to member countries;

8) Contribute to innovation in agriculture and agrifood sectors to reinforce job or added-value creation in rural areas.

Conclusions

- At the end of their meetings, the Ministers and the Heads of Delegation acknowledged that the topics on food security and the struggle against price-volatility, bio-economy and innovation in the agro-food sector, as well as on, [but also the preservation of water, soil and biodiversity, the promotion of the Mediterranean diet and an efficient food chain,] deserve attention at all times. They demand coordinated answers at a political, commercial and logistical level which a Euro-Mediterranean multilateral context can facilitate.

- On these topics and in a context in which many Mediterranean countries are suffering different crises, the ministers and Heads of Delegation acknowledged the efforts made by the Centre in the last decades and voiced their hope for CIHEAM to reinforce its capabilities and keep up its good work for many years to come.

- The Ministers and Heads of Delegation agreed to bring the present recommendations to the attention of the Foreign Ministers of their respective countries so that they can take them into account in international negotiations and in political initiatives in which they are involved.

- Following the invitation of the Hon. Rachid Benaïssa, Minister of Agriculture and Rural Development of Algeria., the Ministers and Heads of Delegation agreed to hold their tenth meeting in 2014 in Algeria.

- They congratulated the Hon. George Pullicino, Minister for Resources and Rural Affairs of Malta, and all his collaborators, for the efforts accomplished towards the success of the present meeting.

- They thanked CIHEAM for its contribution to the success of the meeting, and expressed their full appreciation for this organization that dedicates its daily activities to foster a long-lasting Mediterranean solidarity.

Annex 2.
Conclusions of the CIHEAM International Seminar
"The Sustainability of Food Systems in the Mediterranean Area"
25-26 September 2012, Valetta, Malta

Conclusions of the International Seminar
"The Sustainability of Food Systems in the Mediterranean Area"

25-26 September 2012
Malta

CIHEAM - Centre International de Hautes Etudes Agronomiques Méditerranéennes – with the technical cooperation of FAO (Nutrition and Consumer Protection Division) and in partnership with MOAN has organized the International Seminar on "The Sustainability of Food Systems in the Mediterranean Area", held in Malta, from 25 to 26 September 2012. This document summarises the main issues and makes proposals for actions to be implemented in the Mediterranean basin and highlights concrete projects that can be funded in the coming years.

The main objective of this Seminar, beyond the intrinsic value of the exchanges that took place among the participants (about 70 Euro-Mediterranean experts, senior officials of ministries and international organizations, researchers, etc.), was to provide an innovative approach to reconcile food and nutrition security with sustainability including the use of resources while ensuring the protection of the environment, the adaptation of production systems to climate change, social enhancement and conservation of the Mediterranean diet cultural heritage.

To this end, the participants hope that the recommendations of the seminar will be brought to the attention of the Ministers of Agriculture of the 13 CIHEAM member countries, during their 9th meeting on 27 September 2012.

The participants have also emphasized the importance of the role played by CIHEAM, a privileged space for exchanges and analyses aimed at developing cooperation in the Mediterranean basin, a role that has been confirmed and strengthened in the year 2012 by the 50th anniversary of its establishment.

The participants focused their consultations in two separate sessions:

1. Food Systems and Sustainable Diets: the Mediterranean Diet as a pilot study
2. Organic and quality schemes: Sustainability challenges and prospects in the Mediterranean Region

Context

The participants in the Seminar have made the following observations about the evolution of food systems in the Mediterranean countries:

- Current food consumption and production patterns are not sustainable in the Mediterranean basin due to biodiversity loss, degradation of natural resources, pesticide contamination, climate change, high energy and water consumption, dietary patterns and eating habits changes and high dependency on imports as well as poverty and vulnerability of many rural and urban Mediterranean communities, and particularly the erosion of the Mediterranean diet;

- Currently, in the Mediterranean basin, we have multiple burdens of malnutrition - undernourishment, micronutrient deficiencies, overweight and obesity - due to recent and dramatic shift in dietary patterns. The trends of diet-related diseases (e.g. overweight, obesity, cardiovascular disease, type 2 diabetes, metabolic syndrome, and certain cancers) are alarming, highlighting the inadequacy of the present food systems and dietary patterns. According to WHO (NCD Country Profiles, 2011), overweight and obesity rates in Mediterranean countries continue to rise;

- The protective effect on health of a good adherence to a Mediterranean-type diet has been repeatedly evidenced by scientific and medical studies since the 1960's pioneer Seven countries study;

- Consequently, urgent measures are needed to promote and disseminate the global concept of «sustainable diets[1]». For instance, recent scenarios built to model future sustainable agriculture and food consumption acknowledge the necessary changes towards integrated and agro-ecological systems of production as well as a change in the consumption pattern with a higher plant/animal food ratio;

- In 2012 the European Commission has presented to the European Parliament, the Council, the European Economic and Social Committee and the Committee of Regions, «Innovation for sustainable growth: a bioeconomy for Europe», which, among other things, envisages activities to spread information among consumers about food products adopting a scientific approach (highlighting the benefits of nutrition, methods of production and sustainability of the environment) and to promote a healthy and sustainable lifestyle;

- In 2008, at the 26th FAO Regional Conference for Europe, it was recommended to promote local and traditional food products as an essential way for realizing food sovereignty and biodiverse and resilient food production. Several member nations urged FAO to direct more efforts towards market access and consumer awareness of high value traditional products, acknowledging that traditional agriculture practices are often the only farming methods possible in difficult agro-climatic areas. Several delegations agreed that "organic" was a quality designation important for consumers and significant for sustainable agriculture and environment, and countries needed FAO support in establishing a regulatory framework for implementing and protecting this designation. Many delegations highlighted the Mediterranean Diet being rich in biodiversity and nutritionally healthy. Indeed, the promotion of the Mediterranean Diet could play a beneficial role in the development of sustainable agriculture in the Mediterranean region.

- The traditional and tradition-based innovative food products are a good way to give value to local biosystems, economies and communities and to improve sustainable development;

- Sustainable rural development, organic agriculture and geographical indications were mentioned specifically in the First Conference of Ministers of Agriculture held in Venice in 2003 within the framework of the Euro-Mediterranean Partnership. Organic farming and

[1] "*...Sustainable diets are those diets with low environmental impacts which contribute to food and nutrition security and to healthy life for present and future generations. Sustainable diets are protective and respectful of biodiversity and ecosystems, culturally acceptable, accessible, economically fair and affordable; nutritionally adequate, safe and healthy; while optimizing natural and human resources*." FAO/Bioversity International (2010). Biodiversity and Sustainable Diets - United Against Hunger. Report of a scientific symposium; 3-5 November 2010, Rome.

geographical indications are also mentioned together in various international strategic documents concerning Mediterranean region. Furthermore, development agencies, national governments, private operators and NGOs, working on individual and institutional capacity building for the sustainability of agrofood system, are increasingly taking account the many potential synergies between food quality schemes and certification.

The participants also reflected that the «traditional Mediterranean Diet», recognized by UNESCO as an intangible heritage of humanity in 2010[2], should be considered as a model of sustainable diet in the Mediterranean basin, and able to contribute to the sustainability of the agro-food systems around the Mediterranean and to the valorisation of quality products.
As a result of these observations, the participants to the seminar felt that the attention of the Ministers of Agriculture of the 13 member countries of CIHEAM, who will meet on 27 September 2012, should be drawn particularly on the increasingly unsustainable situation of food systems around the Mediterranean affecting a large proportion of citizens who currently reside in the Southern and Northern Mediterranean, and on methods and strategies to be adopted to reverse this negative trend.

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Proposals for an action program

The participants agreed that actions to be undertaken in order to change this situation are urgent and represent the conditions to permanently modify the observed processes and to develop and implement new strategies for achieving sustainable food systems in the Mediterranean. They relate in particular to:

- The previous statements made by the CIHEAM's countries Ministers of agriculture in 2008 and 2010, summarized by their final declaration in (Istanbul, May 8, 2010), reporting that it is necessary to: "…*Work to promote a healthy and sustainable regional food production system following the standards of the Mediterranean diet that foster the spirit of conviviality and favour consumption of local and seasonal products, particularly by encouraging regional networks to support public decisions for the protection, promotion and marketing of Mediterranean products and the development of environmentally sound agricultural production systems…*".

- The need to reconcile food and nutrition security and sustainable use of resources while ensuring the local food demand and the protection of the environment, and resilience of production systems to climate change and their contribution to its mitigation;

The sustainability of Mediterranean food systems , which represents an important area of thinking and action for governments and international organisations should replace the short-term approaches . In this context, the use of certification and quality assurance measures (geographical indications, organic agriculture, PDO, etc.) is a very effective means of adding value to products in local and international markets.

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[2] « *… derives from the Greek word "diaita" – way of living – it is a social practice based on "know-how, knowledge, and traditions ranging from the landscape to the table and that concern, in the Mediterranean basin, cultures, harvest, fishery, conservation, preparation, cooking and, in particular, the way of consuming* » (UNESCO, 2010).

Activities to be developed

Session I
Food Systems and Mediterranean Sustainable Diets: The Mediterranean Diet as a pilot study
with technical collaboration of FAO

Activities must envisage the implementation, in the 13 member countries of CIHEAM and also member States of FAO, of a pilot project to develop **"Guidelines for improving the sustainability of diets and food consumption patterns in the Mediterranean area"**. The Mediterranean diet, in its various national forms, will be used as a model to describe, understand and improve the sustainability of current diets and food systems.
In order to assess this sustainability, specific indicators should be identified and further developed to be applied to the different 13 CIHEAM's member countries. These indicators will be used, in a first step, to characterize the current production and consumption systems in the various Mediterranean countries and, in a second step, to identify the changes needed to achieve both production systems and consumption patterns with noticeably better sustainability and resilience. Measures to protect and improve the Mediterranean diet are expected. Scenarios will be constructed through modelling various options. This will form the basis to formulate recommendations for cross-sectoral policy instruments allowing the improvement of the sustainability of Mediterranean food systems and food consumption patterns.
A previous technical workshop and an international seminar gathered 51 experts in CIHEAM-MAI in Bari in 2011 to launch a first exchange on the necessary indicators to be implemented for that purpose. This Task Force already raised a first list of possible and relevant indicators in four domains, environment and natural resources; economy; society and culture; nutrition, health and lifestyle. An action plan was also proposed.
These indicators could also be used to assess the sustainability of diets in other parts of the world.

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Session II
Organic and quality schemes: Sustainability challenges and prospects in the Mediterranean Region
in partnership with MOAN

Concerning quality schemes for agricultural products and foods it is suggested to:

- foster cross-border exchange and public-private permanent dialogue through the strengthening of specific **Network initiatives** focussing on quality schemes and labels (e.g. organic agriculture and local identity products) with promising export potential and significant positive implications for the development of local communities and territories;

- establish a cross-border, intergovernmental **Mediterranean Gateway** on quality schemes as well as enhancing bioeconomy through: i) facilitating continued access to up-to-date information on food quality rules, standards and practices changes; ii) providing technical assistance and capacity building to institutional and corporate actors; iii) supporting the design of adequate policies for the integration of Mediterranean small and medium producers and processors into global food quality supply chains; iv) promoting equivalence and local ownership of food quality standards and schemes; v) furthering synergies and complementarities between quality schemes; vi) linking research and enterprising (and clusters) to enhance innovation in agro-food.

Annex 3.
Programme of the CIHEAM International Seminar
"The Sustainability of Food Systems in the Mediterranean Area"
25 – 26 September 2012, Valetta, Malta.

PROGRAMME

CIHEAM International Seminar

THE SUSTAINABILITY OF FOOD SYSTEMS IN THE MEDITERRANEAN AREA

25 – 26 September 2012, Valetta, Malta

14:15 – 14:30 Registration
14:30 – 14:50 Welcome addresses:
H. E. **George PULLICINO**, Minister of Resources and Rural Affairs, Malta
Adel EL-BELTAGY, President of CIHEAM
14:50 – 15:30 Introductory speeches:
Francisco MOMBIELA, General Secretary of CIHEAM
Cosimo LACIRIGNOLA, Director of CIHEAM - MAI Bari

SESSION 1 - 25 SEPTEMBER 2012
FOOD SYSTEMS AND SUSTAINABLE DIETS: THE MEDITERRANEAN DIET* AS A PILOT STUDY
with the technical cooperation of FAO

Introduction to the session

15:30–15:45 **Roberto Capone**
Principal Administrator, Head, Sustainable Agriculture, Food and Rural Development Unit, CIHEAM - MAI Bari

15:45–16:00 **Barbara Burlingame**
Principal Officer, Nutrition and Consumer Protection Division, FAO

Guidelines to improve the sustainability of the Mediterranean Diet

Chairperson: **Denis Lairon**
Vice-President, European Federation of Nutrition Societies (FENS), University Aix-Marseille, France

Rapporteur: **Massimo Iannetta**
Head, Sustainable Development and Innovation of the Agro-Industrial System Technical Unit, National Agency for New Technologies, Energy and Sustainable Economic Development (ENEA), Rome, Italy

16:30-16:50 Traditional foods and sustainable diets: the traditional Mediterranean diet paradigm
Antonia Trichopoulou
Vice-President, Hellenic Health Foundation;
Director, WHO Collaborating Centre for Nutrition, Department of Hygiene and Epidemiology, School of Medicine, University of Athens, Greece

16:50-17:10 Changes of energy intake, body weight excess and food waste in Morocco
Rekia Belahsen
General Secretary, International Union of Nutritional Sciences (IUNS);
Professor, Training and Research Unit on Nutrition and Food Sciences,
Chouaib Doukkali University, Morocco

17:10-17:30 Economic sustainability of Mediterranean food supply chain and diet
Giulio Malorgio
Department of Agrifood Science and Technology, University of Bologna

17:30-17:50 Indicators for agro-biodiversity and nutrition
Bruce Cogill
Director, Department of Nutrition, Bioversity International

17:50-18:10 Sustainable diets as a driver of sustainable food systems
Alexandre Meybeck
Senior officer, Agriculture and Consumer Protection Department, FAO

EU perspective

18:10–18:30 **Marc Duponcel**
European Commission, DG AGRI, Agricultural policy analysis and perspectives

Conclusions of session 1

18:30 **Salvino Busuttil**
Malta Delegate to the Governing Board of CIHEAM,
President of Fondation de Malte

Technical Secretariat

Coordinators:

Roberto Capone, CIHEAM-MAI Bari - Sandro Dernini, FAO

Members:

Habiba Hassan-Wassef, Medical Research Council of the National Research Center, Egypt

Mauro Gamboni, National Research Council (CNR), Italy

Martine Padilla, CIHEAM-MAI Montpellier

Giuseppe Maiani, Agricultural Research Centre (CRA-INRAN), Rome, Italy

Vincenzo Fersino, CIHEAM

Stefano Padulosi, Bioversity International

SESSION 2 - 26 SEPTEMBER 2012
ORGANIC AND QUALITY SCHEMES: SUSTAINABILITY CHALLENGES AND PROSPECTS IN THE MEDITERRANEAN REGION

organized in partnership with MOAN

9:00 – 9:10 Introduction to the session

Maurizio Raeli, Deputy Director of CIHEAM - MAI Bari

Chairperson: **Sebastien Abis**, Principal Administrator CIHEAM

Rapporteur: **Noureddine Nasr**, Programme Officer, Subregional Office for North Africa "SNE" - FAO

9:10 – 9:30 "Challenges for agricultural trade in hard times"
Joseph Wozniak, Trade for Sustainable Development (T4SD) Programme Manager, International Trade Centre (ITC), Geneve, Switzerland

9:30 – 9:50 "Where is agriculture going in the next 20 years? Role and assessment of sustainability schemes"
Daniele Giovannucci, Executive Director, Committee on Sustainability Assessment (COSA™)

9:50 – 10:10 "The New EU quality package and its complementarities with organic agriculture"
Felice Adinolfi, Professor, Faculty of Agricultural Economics and Engineering, University of Bologna, Italy

10:10 – 10:30 Coffee break

10:30 – 10:50 "Complementarities of organic and quality labels linked to origin in Southern Mediterranean countries: the case of Morocco"
Lahcen Kenny, Professor IAV Hassan II, Rabat, Morocco,
Member of MOAN Steering Committee

10:50 – 11:10 "Organic and quality schemes integration: the case of the Cedar Excellence Seal in Lebanon"
Roula Fares, international expert, Lebanon

11:10 – 11:30 "Exploring and building up synergies between organic and other quality schemes in the Mediterranean: the experience of CIHEAM - MAI Bari"
Patrizia Pugliese, Scientific Administrator, Researcher, Organic Agriculture Unit, CIHEAM - MAI Bari

11:30 – 11:50 Coordination of bi-Regional Cooperation with Mediterranean Countries on research and innovation
Claudio Bogliotti, senior advisor for EU Research and Innovation policies, CIHEAM- MAI Bari

11:50 – 12:15 Debate

12:15 - 12:30 conclusions of Session 2
Uygun Aksoy, Professor, Ege University, Izmir, Turkey,
Member of MOAN Steering Committee

12:30 - 13:00 Conclusions and recommendations of the International Seminar
Justin Zahra, Director of Agriculture, Ministry for Resources and Rural Affairs, Malta

Technical Secretariat

Maurizio Raeli, Lina Al Bitar, Patrizia Pugliese, Annarita Antonelli (CIHEAM-MAI Bari)

Uygun Aksoy, Lahcen Kenny (MOAN)

Vincenzo Fersino (CIHEAM-Paris)

Annex 4.
Report of the international workshop "Guidelines for the Sustainability of the Mediterranean Diet", CIHEAM-Bari, 28-29 November 2011, Bari, Italy.

Report of the International Workshop "Guidelines for the Sustainability of the Mediterranean Diet", CIHEAM-Bari, 28-29 November 2011, Bari, Italy.

Editors: Roberto CAPONE, Noureddin DRIOUECH, Maroun ELMOUJABBER, Hamid EL BILALI, Philipp DEBS, CIHEAM-MAIB, Italy; Sandro DERNINI, Forum on Mediterranean Food Cultures, Rome, Italy

Introduction

The Mediterranean diet (MD) was recently recognized by UNESCO, in November 2010, as intangible cultural heritage of humanity. Presently, about one billion people are suffering from hunger and the majority of people in most countries have become overweight and obese. Globalization, industrial development, population increase and urbanization have changed patterns of food production and consumption in ways that profoundly affect ecosystems and human diets. The trends are alarming, highlighting the inadequacy of the present food supply and dietary patterns. Considering that present food production and processing, food supply and distribution, and food consumption systems are not sustainable due to biodiversity loss, natural resources degradation, climate change, high energy input as well as poverty and vulnerability of many Mediterranean rural communities, and, particularly, Mediterranean diet erosion, and a consumer culture of overconsumption; urgent measures are needed to promote and disseminate the concept of "sustainable diets" in Mediterranean countries. According to the FAO (2010): *"...Sustainable diets are those diets with low environmental impacts which contribute to food and nutrition security and to healthy life for present and future generations. Sustainable diets are protective and respectful of biodiversity and ecosystems, culturally acceptable, accessible, economically fair and affordable; nutritionally adequate, safe and healthy; while optimizing natural and human resources."*

In general, a sustainable Mediterranean diet should not generate long-term deleterious effects on health, environment (*e.g.* biodiversity, soil, water, climate, etc.), society and economy and meanwhile improve the human nutrition, wellbeing, lifestyle and quality of life in the Mediterranean countries.

CIHEAM; as an intergovernmental organization dealing with agriculture, rural development, food and natural resources management in the Mediterranean; is very interested in improving the sustainability of Mediterranean agro-food systems. Indeed, in the final conclusions of the Meeting of the Ministers of Food, Agriculture, and Fisheries of CIHEAM's Member Countries in Athens, 2001, was highlighted the importance of promoting the Mediterranean diet as an instrument for the development of Mediterranean countries. The same commitment was confirmed in the meeting held in Zaragoza in 2008. In the final declaration of the 8th Meeting of the Ministers of Food and Agriculture in Istanbul, on May 8, 2010, it was clearly stated that it is necessary to: "…*Work to promote a healthy and sustainable regional food production system following the standards of the Mediterranean diet that foster the spirit of conviviality and favour consumption of local and seasonal products, particularly by encouraging regional networks to support public decisions for the protection, promotion and marketing of Mediterranean products and the development of environmentally sound agricultural production systems…*". CIHEAM and its four Mediterranean Institutes (*i.e.* Bari, Montpellier, Zaragoza, Chania) had a valuable contribution to the nomination of the MD for inscription on the Representative List of the Intangible Cultural Heritage of UNESCO. They were also involved in many initiatives dealing with the MD (*e.g.* workshops, seminars, conferences, roundtables, etc.).

Moreover, in 2010, CIHEAM decided to focus its thirteenth *Mediterra* report, which will be published in 2012, on the theme of "*The Mediterranean diet for regional development*". The report will deal with all issues regarding the Mediterranean diet: origins and structure of the Mediterranean diet, food and socio-cultural dynamics, health and food safety, environment and

biodiversity, social responsibility, actors in the agro-food chain, trade and marketing, and public policies and measures.
On May 26, 2011, the Steering Committee of the international workshop held its first meeting at CIHEAM-Bari to prepare the program of the workshop that focuses on the sustainability of the Mediterranean diet. The follow-up workshop was organised on 28-29 November, 2011, at the CIHEAM-MAIB.

Aims of the workshop
The main aim of the technical workshop was to draft indicators for assessing the sustainability of the Mediterranean Diet taking into consideration the definition of sustainable diets and the new Mediterranean diet pyramid: a lifestyle for today (Bach-Faig *et al*, 2011) describing the main features of the Mediterranean diet common to the different Mediterranean food cultures. The indicators will be used to formulate measures to safeguard and promote the Mediterranean diet and to make recommendations for multi-sectoral policy instruments to enhance the sustainability of the Mediterranean agro-food systems and food consumption patterns. The identified indicators could be useful as a model to assess the sustainability of diets in other regions of the world.

Indicators for assessing the sustainability of the Mediterranean diet
The indicators were identified, developed and refined using a multidisciplinary, transdisciplinary and intersectorial approach around the following priority areas: nutrition, health, and physical activity (*e.g.* food safety, environment food contamination, food biodiversity, food security, respect of seasonality, etc.); society, culture and lifestyle (*e.g.* food cultures, traditional knowledge, etc.); economy (*e.g.* income, employment, etc.); environment (*e.g.* energy efficiency in food lifecycle, food losses and waste, etc.); and agro-biodiversity (Fig. 1).

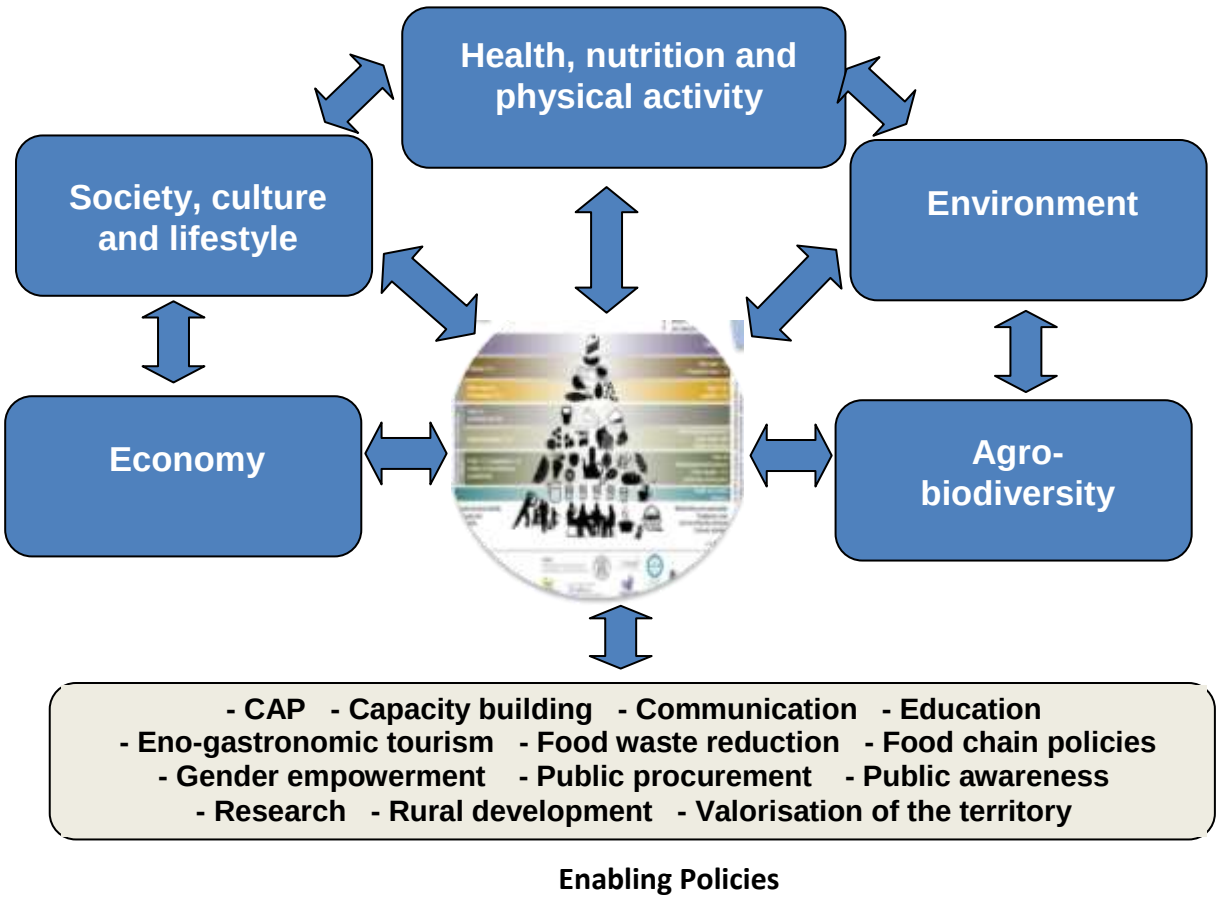

Fig. 2. Some enabling policies for enhancing the sustainability of the Mediterranean diet in the Mediterranean region.

The approval of the indicators to assess the sustainability of the Mediterranean diet by the workshop participants included different steps: identification and elaboration of indicators; discussion of identified indicators and selection of the most suitable ones; and refining of selected indicators (see table 1).

Sources of data

In order to calculate the selected indicators many sources of secondary data can be used especially those from the following databases:

- FAO: FAOSTAT, INFOODS, surveys data (dietary diversity indicator), budget surveys, food security, FAO's commodity tree, food baskets surveys, nutrition, lifestyle, rural income and employment, food losses and waste, etc.
- WHO: health, lifestyle, environment food contamination, etc.
- WHO & EFSA: health, total diets studies (pesticide residues), food safety, environment food contamination, etc.
- CBD: biodiversity erosion, food biodiversity, agro-biodiversity, etc.
- UNEP: environment, food biodiversity, climate change, energy efficiency in food lifecycle, agro-biodiversity, etc.
- FDM & Forum on Mediterranean Food Cultures: respect of seasonality, food cultures, traditional knowledge, etc.
- ENEA
- CIHEAM
- CNR

It goes without saying that this list is far from being exhaustive and that other sources of data will be identified for each indicator.

Enabling policies for enhancing the sustainability of the Mediterranean diet

These identified indicators will be used to design policies in order not only to conserve and preserve the Mediterranean diet, as a common cultural heritage and lifestyle, but also to enhance its sustainability. That requires to develop a set of comprehensive, coherent, integrated and holistic policies that deal with different spheres and arenas of nutrition, health, lifestyle, society, culture, economy, environment; and agro-biodiversity.

Concluding remarks and way forward

The participants decided to create a "Task Force on Indicators for Assessing the Sustainability of the Mediterranean Diet". CIHEAM, ENEA, FAO, and CNR expressed their willingness to join it by developing some specific indicators.

The Task Force is open to all organizations and institutions that participated to the workshop and are ready to assume the responsibility to develop indicators for assessing the sustainability of the Mediterranean diet.

CIHEAM-MAIB will constitute a Secretariat for the Coordination of the Task Force that will be based at the CIHEAM-Bari.

The main objective of the Task Force is to develop indicators for assessing the sustainability of the Mediterranean diet. The results and output of the Task Force's activities will be presented on September 24-25, 2012, in Malta. The presentation will be given in a session of a seminar that will be organised jointly with the 9th meeting of the agriculture Ministers of CIHEAM member countries.

References

Bach-Faig A, Berry EM, Lairon D, Reguant J, Trichopoulou A, Dernini S, Medina XF, Battino M, Belahsen R, Miranda G, Serra-Majem L. (2011). Mediterranean diet pyramid today: science and cultural updates. Public Health Nutrition: 14(1A), 1–11. doi:10.1017/S1368980011002515.

FAO. (2010). Biodiversity and Sustainable Diets - United Against Hunger. Report of a Technical Workshop; 3-5 November 2010; FAO, Rome.

WHO. (2011). Non communicable diseases country profiles 2011. World Health Organization (WHO), Geneva. ISBN: 978924502283.

List of participants

The workshop brought together experts (nutritionists, agronomists, economists, social scientists) from many organisations:

1. **Anna BACH-FAIG,** Scientific Coordinator**,** Fundación Dieta Mediterránea (FDM), Barcelona, Spain
2. **Rekia BELAHSEN**, General Secretary, International Union of Nutritional Sciences (IUNS); Professor Training and Research Unit on Nutrition and Food Sciences, Chouaib Doukkali University, Morocco
3. **Gianluca BRUNORI**, Professor, Laboratory of Agricultural and environmental economics, Pisa University, Italy
4. **Barbara BURLINGAME**, Group Leader, Nutrition Assessment and Nutrient Requirements Group, Nutrition and Consumer Protection Division, FAO
5. **Fabian CAPITANIO**, University of Naples "Federico II", Italy
6. **Roberto CAPONE**, Principal administrator, Centres International de Hautes Etudes Agronomiques Méditerranéennes (CIHEAM), Mediterranean Agronomic Institute of Bari (MAIB), Italy
7. **Gianluigi CARDONE**, CIHEAM-MAIB
8. **Nicole DARMON**, Research director, University Aix-Marseille, France
9. **Philipp DEBS**, University of Bologna, Italy
10. **Sandro DERNINI**, Coordinator, Forum on Mediterranean Food Cultures, Rome, Italy
11. **Hamid EL BILALI**, CIHEAM-MAIB
12. **Abderaouf EL FERCHICHI**, CIHEAM-MAIB, Italy
13. **Maroun ELMOUJABBER**, CIHEAM-MAIB, Italy
14. **Vincenzo FERSINO,** CIHEAM, France
15. **Mauro GAMBONI**, Agro-Food Department, Italian National Research Council (CNR), Italy
16. **Francesco GIARDINA,** Project Coordinator, Italian information system on organic farming (SINAB), Italy
17. **Habiba HASSAN-WASSEF**, Adviser on Nutrition and Health Policy in Development; Member of the Medical Research Council of the National Research Centre, Giza, Egypt
18. **Massimo IANNETTA**, Head, Sustainable Development and Innovation of the Agro-Industrial System Technical Unit, National Agency for New Technologies, Energy and Sustainable Economic Development (ENEA), Rome, Italy
19. **Denis LAIRON**, President, European Federation of Nutrition Societies (FENS), University Aix-Marseille, France
20. **Giulio MALORGIO**, Professor, University of Bologna, Italy
21. **F. Xavier MEDINA**, Director, Department of Food Systems, Culture and Society, Universitat Oberta de Catalunya (UOC), Barcelona; Coordinator, International Commission on the Anthropology of Food and Nutrition (ICAF)-Europe, Spain
22. **Martine PADILLA**, Scientific Director, CIHEAM - Mediterranean Agronomic Institute of Montpellier (MAI-M), Montpellier, France
23. **Stefano PADULOSI**, Senior Scientist, Bioversity International, Rome, Italy

CIHEAM-MAIB's staff and guests:

1. **Youssef ABOUSSALEH**, Professor at Ibn Tofail University, Kenitra, Morocco
2. **Marie Reine BTEICH,** CIHEAM-MAIB, Italy
3. **Noureddin DRIOUECH,** CIHEAM-MAIB, Italy
4. **Pietro PERRINO,** Research Manager**,** CNR, Italy
5. **Patrizia PUGLIESE**, CIHEAM-MAIB, Italy

Twenty-three Mediterranean young professionals attending the Sustainable Agriculture advanced specialisation course held at CIHEAM-Bari, academic year 2011-12, will take part to the workshop:

1. **Suzy ABDEL-AZIZ**, Researcher, Agricultural Research Centre, Egypt
2. **Abdelaziz ABDELKHALEK**, Researcher, Water Requirement and Field Irrigation Department - Soils, Water and Environment Research Institute, Egypt
3. **Muslim ABDULHUSSEIN**, Assistant professor, College of Agriculture, University of Kufa-Najaf, Iraq
4. **Mohammad AL-HARAHSHA**, Supervisor, The Jordanian Hashemite Fund for Human Development, Jordan
5. **Mahmoud AL-KHASHASHNEH**, Lecturer and researcher, Jordan University of Science and Technology, Jordan.
6. **Aicha BALA**, Engineer, Agence Nationale de la Conservation de la Nature, Algeria

7. **Andenet Degefa BEDADA**, Ethiopia
8. **Mohamed BESHR**, Environmental specialist/ Trainer, Egyptian Environmental Affairs Agency-Central Management for Environmental Impacts Assessment-Cabinet of Ministers, Egypt
9. **Burim BYTYCI**, Project Coordinator, International Fund for Agricultural Development (IFAD), Kosovo
10. **Amare Mengistu DESSALEW**, Ethiopia
11. **Doaa HUSSEIN**, Project manager, Agriculture Guiding and Awareness Society, Palestine
12. **Mohammad HUSSEIN**, Head of IPM department, Ministry of Agriculture, Palestine
13. **Snezana JOVICIC**, researcher, Faculty of science, Novi Sad University, Serbia
14. **Moataz KAMAL METWALLY ELNEMR**, Assistant professor, Faculty of Agriculture, Kefrelsheikh University, Egypt
15. **Sonia KECIRI**, Engineer in Natural Sciences Institut Technique de L'arboriculture - Ministry of Agriculture, Algeria
16. **Dunia KHALIFEH**, BS in food science, Lebanon
17. **Milos KNEZEVIC**, Adviser, Agricultural Extension Service "Seme Tamis" in Pancevo, Serbia
18. **Enkelejd LEKAJ**, Agricultural Engineer, University of Tirana, Albania
19. **Cadro SABRIJA**, Assistant professor, Faculty of Agriculture and Food Science, university of Sarajevo, Bosnia and Herzegovina
20. **Maria SCHIATTONE**, Researcher, University of Bari, Italy
21. **Jasmina SIMIĆ**, Researcher, The Agricultural Institute of the Republic of Srpska, Bosnia and Herzegovina
22. **Remzi PAGARIZI**, Graduate in fruit growing and viticulture, Kosovo
23. **Vesna ZECEVIC**, Environmentalist, Directorate of Construction, Urban Planning and Building Land of Smederevo, Serbia

Organizing Committee:
Roberto CAPONE, CIHEAM-MAIB
Sandro DERNINI, Forum on Mediterranean Food Cultures
Maroun ELMOUJABBER, CIHEAM-MAIB, Italy
Noureddin DRIOUECH, CIHEAM-MAIB, Italy
Hamid EL BILALI, CIHEAM-MAIB
Philipp DEBS, University of Bologna, Italy

Workshop agenda

November 28, 2011	**Morning**	
10:00	**Opening session** ***Welcome and opening notes***	Cosimo LACIRIGNOLA, CIHEAM-MAIB director
10.15-10.45	Objectives and expected output of the workshop	Roberto CAPONE, CIHEAM-MAIB Sandro DERNINI, FMFC
11.00-12.00	Discussion of and agreement on work methodology	Workshop participants
12.10-13:00	Two working groups for the identification and elaboration of indicators	Workshop participants
13.00-14.30	***Lunch Break***	
	Afternoon	
14.30-16:00	Two working groups for the identification and elaboration of indicators	Workshop participants
16:00-18:30	Discussion of indicators identified by both working groups and selection of the most suitable ones	Workshop participants
November 29, 2011	**Morning**	
09.00-13.00	Refining of selected indicators	Workshop participants
13.00-14.30	***Lunch break***	
	Afternoon	
14.30-16.20	Presentation of indicators refining session results and plenary discussion	Workshop participants
16:20-16:40	Editing and approval of final indicators and discussion of future initiatives	Workshop participants
16.40-16.50	**Concluding remarks**	Roberto CAPONE, CIHEAM-MAIB

16:50-17:00	**Farewell note**	Cosimo LACIRIGNOLA, CIHEAM-MAIB

Call for action for the sustainability of the Mediterranean diet, May 26, 2011, CIHEAM – Bari.

Considering that most current agro-food systems are not sustainable due to loss of biodiversity, natural resources degradation, climate change, high energy input, erosion of the Mediterranean diet, urgent measures are needed to promote and disseminate the concept of "sustainable diets" in the various contexts worldwide, both in industrialized and in developing countries.

"...Sustainable diets are those diets with low environmental impacts which contribute to food and nutrition security and to healthy life for present and future generations. Sustainable diets are protective and respectful of biodiversity and ecosystems, culturally acceptable, accessible, economically fair and affordable; nutritionally adequate, safe and healthy; while optimizing natural and human resources." (International Scientific Symposium on "Biodiversity and Sustainable Diets - United against Hunger", 3-5 November 2010, FAO-Rome).

Based on such a shared definition, the secretariat of the Cross-cutting Initiative on Biodiversity for Food and Nutrition - CIBFN (Convention on Biological Diversity, FAO and Bioversity International) welcomes CIHEAM's proposal to collaborate in the organization of the International Workshop to be held in Bari in November 2011 to formulate Guidelines to Improve the Sustainability of the Mediterranean Diet.

These Guidelines comprise the following elements:

- Features of the Mediterranean diet common to the different Mediterranean food cultures;
- steps and measures to safeguard and promote the Mediterranean diet; and
- recommendations for multi-sectoral policy instruments to ensure the sustainability of the Mediterranean agro-food systems.

The workshop will also identify the characteristics of the Mediterranean diet that can serve as a model for sustainable diets in other ecosystems.

The Mediterranean diet was recognized by UNESCO, in November 2010, as intangible cultural heritage of humanity[3].

On May 26, 2011, the Steering Committee[4] of the International Workshop held its first meeting at CIHEAM-Bari to prepare the program around the following research and action priority areas:

- contribution of the Mediterranean diet to biodiversity promotion in Mediterranean agro-food systems;
- social and economic sustainability of the Mediterranean diet;
- nutrition and health aspects of the Mediterranean diet;
- relationship between the Mediterranean diet and traditional knowledge in Mediterranean communities;
- environmental impacts of Mediterranean agro-food systems on natural resources in the region, particularly climate change.

The Steering Committee invites national and regional governments of the Mediterranean Basin, International Organizations, research institutions, civil society and the private sector to contribute to the success of the workshop.

[3] « *… derives from the Greek word "diaita" - way of living - it is a social practice based on "know-how, knowledge, and traditions ranging from the landscape to the table and that concern, in the Mediterranean basin, cultures, harvest, fishery, conservation, preparation, cooking and, in particular, the way of consuming*» (http://www.unesco.org/culture/ich/index.php?lg=en&pg=00011&RL=00394).

[4] Barbara BURLINGAME (FAO – Rome), Martina OTTO, (UNEP – Paris), Roberto CAPONE (CIHEAM Bari), Denis LAIRON (FENS – Marseille), Rekia BELHASEN (IUNS – Morocco), Martine PADILLA (CIHEAM – Montpellier), Massimo Iannetta, (ENEA, Rome), Habiba HASSAN-WASSEF, (NRC - Egypt) , Joan Reguant (FDM Barcelona), Sandro DERNINI (FAO Rome), Stefano PADULOSI (Bioversity International - Rome), Xavier MEDINA (ICAF – Europe).

Annex 5.
Proposed indicators for evaluating the sustainability of Mediterranean Diets by the MD Working Group (MDWG).

Proposed Indicators for Evaluating the Sustainability of Mediterranean Diets, Mediterranean Diets Working Group (MDWG)

Developing guidelines to improve the sustainability of the current Mediterranean diet

Evaluation of the sustainability of Mediterranean Diets

Case study: Morocco

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CIHEAM-MAIB: Economic indicators

Roberto CAPONE, Hamid EL BILALI, Philipp DEBS, Virginia BELSANTI
Giulio MALORGIO, University of Bologna

1. Food consumer price index (FCPI): cereals, fruit, vegetables and meat

Food Price Index is a measure of the monthly change in international prices of a basket of food commodities. It is a current social and economic indicator that is constructed to measure changes over time in the general level of prices of consumer goods and services that households acquire, use or pay for consumption.

2. Cost of living index (COLI) related to food expenditures: cereals, fruit, vegetables, fish and meat

This indicator aims to measure the effects of price changes on the cost of achieving a constant standard of living. The cost of living index measures relative evolution in retail prices over time and space.

3. Distribution of household expenditure groups: Food

The distribution of household expenditure groups refers to the average monthly or annually totals household expenditure and its percentage distribution by household consumption and household non-consumption expenditures. It is the value of consumer goods and services acquired, used or paid for by a household. This indicator assesses the percentage of household annual income that is spent for buying food and non-alcoholic beverages.

4. Food self-sufficiency: cereals, fruit and vegetables

Food self-sufficiency is defined as the ability of a country to meet food consumption needs (particularly for staple food crops) from own production rather than by buying or importing. This indicator measures the degree of national food self-sufficiency considered as the share of national production in total national consumption of determined groups of products (e.g. cereals, fruit and vegetables).

5. Intermediate consumption in the agricultural sector: nitrogen fertilizers

This indicator gives an idea about the level of intensification of the agricultural production process. It accounts flow of nitrogen fertilizers used up as input in agricultural production. It is calculated as the average quantity of nitrogen (in kg) used per hectare of national utilised agricultural area (UAA).

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National Institute for Research on Food and Nutrition (INRAN)[1] & CIISCAM/ Sapienza University of Rome[2]:

Health and nutrition indicators

Angela POLITO[1], Aida TURRINI[1], Federica INTORRE[1] and Giuseppe MAIANI[1]
Lorenzo M DONINI[2], Alessandro PINTO[2], Annamaria GIUSTI[2] and Valeria del BALZO[2]

1. Energy density - solid food only (proxy for frugality)
This indicator measures the amount of energy (Kcal) in 100g of diet (based on solid food only).

2. Insufficient physical activity: Physical inactivity prevalence
Individuals not meeting any of the following criteria: at least 30 minutes of moderate-intensity activity per day on at least 5 days per week, or at least 20 minutes of vigorous-intensity activity per day on at least 3 days per week, or an equivalent combination.

3. Fruit and vegetables consumption
It measures the intake (g/day) of fruit and vegetables.

4. Vegetable/Animal proteins
It is the ratio between vegetable (cereals, vegetables, pulses, fruit, oil) and animal (meet, fish, eggs, dairy products) proteins intake.

5. Nutritional Anthropometry (over and undernutrition)
- **Overweight or obesity:** Prevalence of individuals having a body mass index (BMI) >=25.0 kg/m² calculated from self-reported weight and height.
- **Undernutrition:** Prevalence of individuals having a body mass index (BMI) <18.5 kg/m^2 calculated from self-reported weight and height.

6. Obesity and related morbidities
It is the prevalence of individuals having obesity, physician-diagnosed cardiovascular diseases, type II diabetes, osteoporosis, some types of cancer.

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Italian National Research Council (CNR):

Socio-cultural indicators

Mauro GAMBONI and Silvana MOSCATELLI

1. Collective participation, cohesion, conviviality and commensality: Proportion of meals alone consumed outside home
Consuming and sharing the same food at the same table is to be considered a social experience and represents a peculiar characteristic of Mediterranean lifestyle. The distance from the social sustainability is measured by food consumption in places other than a "table" around which people consume the same meal together. The indicator proposed is the "proportion of meals consumed individually not collectively outside home in a week" which is useful to indicate the level of conviviality and sharing the same food at the same table. Social sustainability of diet is inversely proportional to the frequency of such episodes.

2. The involvement of consumer in the preparation of food: Proportion of already prepared meals
Preparing and cooking food is expression of the importance devoted to food by people in their daily life. For this reason, the time dedicated to the preparation of food and the selections of fresh products in the daily diet have specific and significant social implications. The objective is to assess the direct consumer intervention in the preparation of food. The distance from the social sustainability is measured, in this case, by the frequency of consuming pre-cooked food directly ready to use. The indicator proposed is the "proportion of already prepared meals consumed in a week" which is useful

to understand the effective involvement of the consumer in preparing food. Social sustainability of diet is inversely proportional to the occurrence of these kind of food consumption.

3. Traditional diets relevance: Consumption of traditional products (e.g. Proportion of product under PDO (Protected Designation of Origin) or similar recognized traditional food

The presence of traditional food in population current diet is a clear manifestation of recognizing their cultural identity. The culinary culture represents not only the sum of diverse food referred to it but also food habits which regulates the relationship between the individual and the food. The distance from the cultural sustainability is measured by the absence/low consumption of traditional food, resorting to the use of food without identity.

The indicator proposed is the "proportion of product under PDO (Protected Designation of Origin) or similar recognized traditional food consumed in a week", which is useful to verify if and how much traditional products are currently consumed, as expression of the cultural aspects and traditions connected to food.

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Italian National Agency for New Technologies, Energy and Sustainable Economic Development (ENEA) & WWF-Italy: Environment indicators

Massimo IANNETTA (ENEA) & Eva ALESSI (WWF-Italy)

1. Water footprint (ENEA)

The water footprint is an indicator of freshwater use that looks at both direct and indirect water use to produce specific groups of products and it's measured in terms of water volumes consumed (evaporated or incorporated into a product along its supply chain). The water footprint is a geographically explicit indicator.

2. Carbon footprint (ENEA)

The Carbon footprint is an indicator of the total amount of greenhouse gases produced to directly and indirectly support human activities, usually expressed in equivalent tons of carbon dioxide (CO_2). It's associated to a specific groups of products and it's calculated following some steps defined by the GHG protocol corporate standard.

3. Nitrogen footprint (WWF-Italy)

The Nitrogen footprint (NF) is a measure of the amount of reactive nitrogen (all N species except N_2) released into the environment as a result of human activities. The excess N in the ecosystems causes eutrophication, enhanced greenhouse effect, biodiversity loss, acidification, etc.

Annex 6.
Proposed expert system for evaluating the sustainability of Mediterranean diets.

Expert System for Evaluating the Sustainability of Mediterranean Diets by an Integrated Product Index (IPI-SMeD) in a Specific Agro-ecological Zone

Author: Massimo Iannetta (ENEA)

Introduction

The approval of the indicators to assess the sustainability of the Mediterranean diet will include different steps: identification and elaboration of indicators, discussion of identified indicators and selection of the most suitable ones, refining of selected indicators and their evaluation by means of scores calculation.

The indicators were identified, developed and refined using a multidisciplinary, trans-disciplinary and inter-sectorial approach around the following priority areas: 1. environment and natural resources (including ago-biodiversity), 2. economy, 3. society and culture, 4. nutrition, health and lifestyle (Fig. 1).

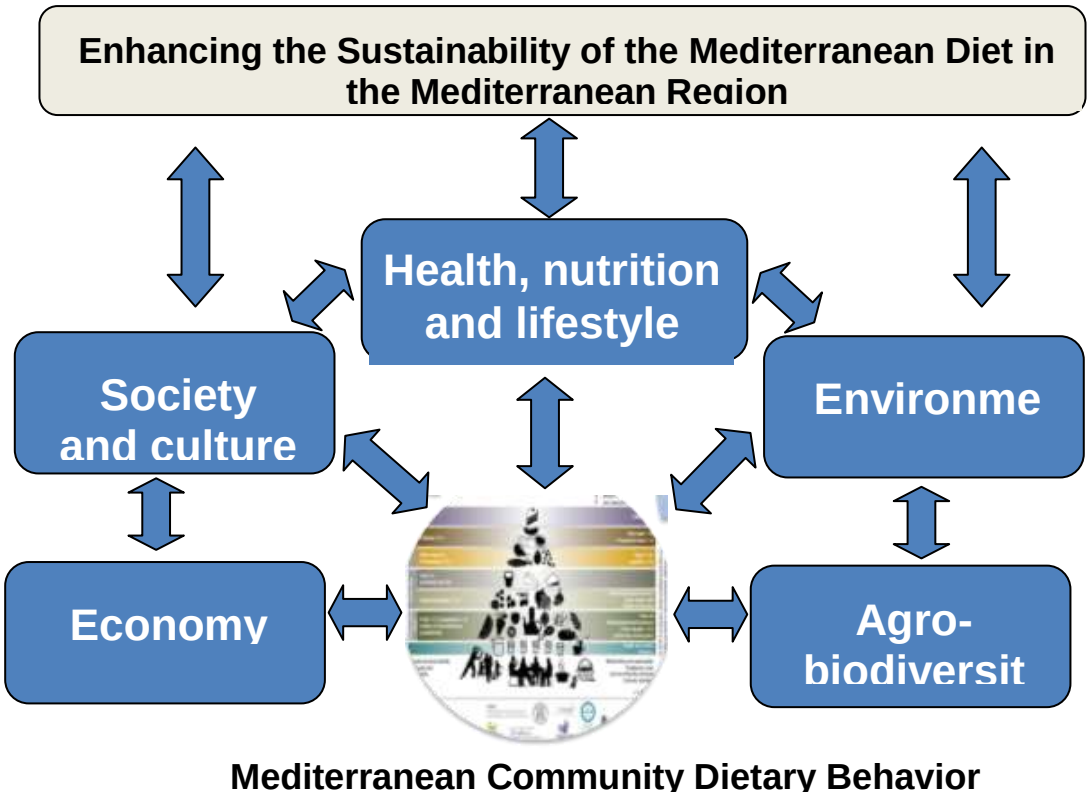

Fig. 1. Priority areas for developing indicators to assess the sustainability of the Mediterranean diet.

To establish the causal relationships between all these aspects is a complicated, multi-phase process. The Mediterranean Diet framework has provided a consensus in the definition and production of indicators which, in turn, enables the data requested to be standardized and benchmarked.

Considerable amounts of data are required in order to estimate the Sustainability of Mediterranean Diets by an Integrated Product Index (IPI-SMeD) in a specific Agro-ecological zone. Data alone, however, is useless without appropriate tools for their efficient exploitation. In terms of tools - sophisticated techniques must be used to acquire and manage the large amounts of spatial and temporal data. These data, which are becoming ever more complex and which produce heterogeneous information layers with different levels of detail, are necessary to solve the crucial and intricate problems of today.

Data related to environment and natural resources (including ago-biodiversity), economy, society and culture, nutrition, health and lifestyle, can be obtained from available documents or obtained by dedicated surveys where costs depend on the ease with which they are obtained. The complexity of the

information is related to the sophistication of the questions that have to be answered; yet the combination of different data and complex questions means that the data have to be analysed in an integrated way to extract succinct, and well founded, answers.
In this context, a comprehensive system has to be developed to evaluate and investigate the causes and responses which contribute to the Sustainability of Mediterranean Diets by an Integrated Product Index (IPI-SMeD) in a specific Agro-ecological zone. The coverage of the scheme ranges from the local to basin-wide scales in terms of Agro-ecological zone in the following countries: Italy, France, Spain, Greece, Malta, Morocco, Egypt, Tunisia, Lebanon and Turkey. The system proposed here is an expert application based on a combination of different competences.

Methodological hypothesis
The Sustainability of Mediterranean Diets by an Integrated Product Index (IPI-SMeD) in a specific Agro-ecological zone is a complex concept to rationalise since, depending on the context, it can be generated by many different factors operating in isolation or in association. It can be considered, in general, as a delimited entity in which environmental, nutritional and socio-economical factors are not balanced or are not sustainable for that particular area. In order to make informed decisions it is necessary to be able to characterise and identify the significant factors which produce critical situations. As these factors are rarely independent, it is also necessary to be able to establish their interrelationships so that their relative contributions can be determined. On the other hand decision makers require functional summaries highlighting major issues.

Figure 2 - Scheme of the IPI-SMeD estimate.

<table>
<tr><th>Level 1</th><th>Level 2</th><th>Level 3</th><th>Level 4</th></tr>
<tr><td>Indicators
(Input Layers)</td><td>Priority Areas
(Quality Layers)</td><td rowspan="4">For each product in a specific Agro-ecological zone

IPI-SMeD</td><td rowspan="4">Evaluation of Sustainability of specific Diets, based on the combination of different products

Sustainability of Mediterranean Diets</td></tr>
<tr><td>1. Water Footprint
2. Carbon Footprint
3. Ecological Footprint
4. Energy Efficient</td><td>A. Environment and natural resources (including Agro-biodiversity)</td></tr>
<tr><td>1.
2.
3.
4.</td><td>B. Economy</td></tr>
<tr><td>1.
2.
3.
4.</td><td>C. Society & Culture</td></tr>
<tr><td>1.
2.
3.
4.</td><td>D. Nutrition, Health and Lifestyle</td><td></td><td></td></tr>
</table>

The quantification of different Index levels at the local scale can be carried out by evaluating the overall influence that single information layers (Indicators) have on the product under study. The goal is to develop a system which would function irrespective of the number and type of information layers at its most primitive level. This is achieved by adopting a four levels approach as illustrated in figure 2. In the first two levels the four single quality layers (Priority Areas) are first determined from the basic data layers (indicators) and in the second phase the final sustainability of the specific product in a specific area (third level) is evaluated from the quality layers. The last step (fourth level) is the evaluation of the sustainability of the Mediterranean Diets by means of the combination of different products.

The primary score in each Priority Area (Quality) is estimated as the geometric mean of its own Indicators (layers):

$$Quality\_x = (layer\_1 * layer\_2 * layer\_3 * layer\_4)^{(1/4)} \quad [1]$$

The first level, that of the basic data layers, isolates the rest of the system from the details of the data. The Quality layer, level 2, acts as a buffer between the level 1 data layers and the derived IPI-SMeD layer, level 3. With the four Qualities obtained from the above, the IPI-SMeD is estimated by:

$$IPI\text{-}SMeD = (Quality\_1 * Quality\_2 * Quality\_3 * Quality\_4)^{(1/4)} \quad [2]$$

According to the factorial scaling technique, to each of indicators is assigned a score ranging from 1 (good conditions) to 2 (deteriorated condition). In addition, value "zero" is assigned to the areas where the measure is not appropriated and/or those, which are not classified. The classes and the scores are based on the influence that various parameters have on the sustainability processes. In the most cases, the function representing the variation of the indicators (score) is a liner ranging between the extreme values (1–2).

Computed values are continuous within the selected ranges, from 1 to ~ 2, but for interpretation and representation purposes it is suggested to group them into classes. Class grouping is an open process in which threshold values are selected depending on the phenomena that is needed to put in evidence. The IPI-SMeD scores give an efficient and simply to use estimate of different levels of product sustainability present in a defined area.

Conclusions

The main aim of the Sustainability of Mediterranean Diets by an Integrated Product Index (IPI-SMeD) is to define a reference framework to be used in analysing various situations within specific Agro-ecological zone, under the following operational constraints:

- the system must be reasonably simple to establish, robust in operation, and widely applicable;
- the selection of the information layers is made, not only on the basis of their actual information content (i.e. their relationship with the phenomena under study), but also as a function of our ability to obtain and update the data with ease and economy;
- the system must be adaptable and accommodate the development and refinement of the existing information content and the addition of new information.

Regarding data analysis, data processing techniques usually simplify the data when deriving results. Sampling and homogenisation cause a reduction in data accuracy as highly detailed information layers, and layers with different information, can only be joined to each other at a simpler level. Classification procedures used to interpret the different information layers also lose information. In fact, classifications simplify the data by summarising the multiplicity of sampled, or calculated, attribute values with a limited number of intervals, whereby the initial detailed information are lost in the coarser classification groupings. Interpretations and simplifications of the data are, however, required whether arising from the need to provide classifications, to group the data in a homogeneous way, to organise the data into common reference systems, or when comparing different types of environments.