AGRO-BIODIVERSITY AND DIVERSIFIED AGRI-LIVESTOCK SYSTEMS

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Panel 3.2 on "AGRO-BIODIVERSITY AND DIVERSIFIED AGRI-LIVESTOCK SYSTEMS" moves from some considerations about the interconnections among agriculture, rural development strategies and urban and peri-urban areas expansion.

Agriculture uses a third of the planet's surface and is the main activity for most of the world's population. The different farming systems, indigenous people and local communities have been, since a long time, the guardians of a large part of the Earth's resources. We must not forget that all the natural resources from which the agriculture depends need continuous care and that its sustainability is increasingly called into question.

To analyze the rural world, it is possible to use the categorisation of agricultural system made by Vorley [1] in 2001:

- "Rural World 1": the "commercials farmers", or the entrepreneurs belong to this category. It is a minority group of producers with large plots of land and availability of financial resources, that produces for the market and are connected into the global agrifood economy. They have often benefited from government subsidies and other forms of credit facilitations.
- "Rural World 2": this category includes the "traditionalists", or small/medium landowners. In addition to the production for family consumption, they are able to devote even a small part of their production to the market. Normally they owns property rights on their land and they are often organized in associative forms [2].
- "Rural World 3": here are included small landowners who live in conditions of subsistence and whose production often fails to satisfy family consumption needs. They live in conditions of absolute precariousness and fragility, they are often prone to emigrate and have little rights and minimum income.

Dealing with the context of developing countries, Lovisolo [3] has recently suggested to add the category of the "survivors", namely farmers with no access to land and forced to offer their workforce to others. Among them malnutrition is widespread and emigration is the only alternative.

It is not a novelty that essentially poverty is a rural phenomenon: "70% of the billion and a half people in the world live in conditions of absolute poverty - with less than $ 1.25 a day - in fact resides in rural areas and is concentrated in some Asian countries and particularly in sub-Saharan Africa" [4]. The persistence and concentration of poverty in rural areas are therefore highly crucial issues where it is necessary to intervene with development strategies targeted to the rural sphere.

This critical situation is caused by several factors, as the lack of access to production means and resources for most of rural communities and the replacement of the pre-existing agro-ecological systems with the industrialized ones.

Agro-ecosystems simplification results in loss of biodiversity and in the consequent decreased provision of ecosystem services, which are essential inputs for agriculture and for society.

Besides, the oligopoly of production factors leaded by corporations, the inability of small farmers to compete in the global market and the difficulty of accessing to land results in many countries in a patchy distribution of resources, high rates of poverty, but even the loss of safety on production and availability of food/currency.

All these considerations identify a local and global framework where is compelling to find solutions that ensure the availability of food in the present as in the future through the implementation of more sustainable, fairer and safer production systems. Dealing with these issues, we are forced also to deal with the conservation and use of biodiversity.

In developing countries rural communities have been often the engine of indigenous biodiversity conservation thanks to everyday use of local species for food and other purposes. It is so important to maintain and enhance the role of local species and breeds in the definition of sustainable agricultural systems, where biodiversity can play also a role also in the cultural identification of the communities.

To examine more in depth these topics, we started with the work by Prof. Sottile of the Department of Production Science and Agri-Environment of the University of Palermo titled CULTURAL IDENTITY AND CONSERVATION OF INDIGENOUS AND NATIVE DIVERSITY which highlights the need in Africa, to know and valorise local species. We meet the same need in the paper LOCAL FRUITS AND NUTS AS A TOOL FOR THE DEVELOPMENT OF AFGHANISTAN where Prof. Giordani of the Department of Production Science and Agri-Environment, University of Florence, presents the excellent results of the Perennial Horticulture Development Project - Afghanistan (Phdp) (www.afghanhorticulture.org) funded by the EC EuropeAid Program (2006). Dr. Fiorito with ANALYSIS OF THE SUSTAINABILITY OF THE SLOW FOOD MUSHUNU CHICKEN PRESIDIUM IN KENYA introduces a case study where the exploitation of a local breed of chicken provides short time excellent results from the point of view of social

environmental and economic sustainability in a system of small-scale farming. The paper THE ROLE OF DIVERSITY AND DIVERSIFICATION FOR RESILIENT AGRICULTURAL SYSTEMS of Dr. Tecco of the Department of Agricultural Sciences, Forest and Food Sciences of University of Turin, underlines the links between biodiversity and resilience and the challenging option of using resilience as an approach for managing the system especially for cooperation development projects that operate in various ways to safeguard and promote biodiversity. Finally, during the Congress, Dr. Turco of the NGO Mais reports the experience of the Coordination of farmers in Piedmont (Coordinamento Contadino Piemontese - http://coordinamentocontadinopiemontese.noblogs.org/) and its experience in the promotion of values and practices of small scale farming in Piedmont as a form of a differentiated agricultural systems.

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[3] Lovisolo, F. (2013), op. cit.

[4] Lovisolo, F. (2013), op. cit.

CULTURAL IDENTITY AND CONSERVATION OF INDIGENOUS AND NATIVE DIVERSITY

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ABSTRACT

The economic development of rural areas has rarely followed that of urban centres, with greater evidence of this in developing countries where the outlying communities have remained considerably more remote from the systems of cultural and economic growth. Even if this has had negative repercussions in terms of social equilibrium within the various countries, from a strictly agronomic point of view it has often resulted in the natural conservation of indigenous and native biodiversity. This has been affected by the natural and daily use of local plant extracts both for nutritional purposes and for a variety of other reasons. The exchange of genetic material between one community and another, often a sign of respect and friendship, has helped to increase plant diversity and to enhance its role in the everyday diet of rural populations.
Any activity aimed at conserving biodiversity cannot disregard the fact that native plant species (and even more indigenous species) now play a vital role in the cultural identity of rural communities, and that making such communities aware of this precious asset can also play a strategic part in the idea of promoting biological diversity as a way of developing local economies. Such evidence clearly emerged through the various activities conducted in the context of the project, FAO GTF/RAF/426/ITA *Promoting Origin-linked Quality Products in Four Countries in West Africa*, financed by the Slow Food Foundation for Biodiversity Onlus. This project, conducted in 4 West African countries (Sierra Leone, Guinea Bissau, Senegal and Mali), aimed to carry out a study of these 4 states and draw up an inventory of the traditional plant and animal species, to examine the link between these and the diet of rural populations, and to assess the risks of genetic erosion by actions to safeguard the native biodiversity.

INTRODUCTION

In some developing countries with a greater incidence of native and indigenous plants and animals linked to the cultural and dietary customs of the local peoples, any approach to the study of biodiversity and the use of this in diet is bound to introduce a more complex view of the situation. Such a vision is linked to questions concerning the concept of land ownership, the right to exploit native resources, and the guarantee of access to such resources, especially if they provide a substantial part of the local people's sustenance [1]. The Convention on Biological Diversity (1992 CBD) has already defined certain specific roles for the contracting nations, ensuring that conservation of biodiversity is linked to the knowledge and practices of indigenous peoples and local communities, in particular the rural populations [2]. In this sense, also, the conservation approach is geared towards interventions which respect the traditional ways of life: important for the conservation and sustainable use of biological diversity, in the broad sense, but also more vital in promoting any sort of conservation activity with the approval and involvement of the possessors of this knowledge, and in producing a fair division of the benefits that can derive from the use of such knowledge and practices.

This approach is substantially more valid in countries where development has been obstructed by a variety of factors, and where local genetic resources, whatever their geographic origin, represent not only an important aspect of subsistence but also play a not inconsiderable role in the field of medicine and medicinal treatments. This is a matter, in this instance, of forms of traditional knowledge that the indigenous populations and the local communities guard with jealousy and respect, fearing that they are more likely to disappear through use than through possession. There have been various attempts to identify methods of protection, but their management, even prior to their implementation, has always been very difficult to apply, especially in the context of that constant play between tangible and intangible components which often come together in traditional knowledge [3].

The relationships between traditional knowledge and natural resources have been the subject of extensive study over many years, and the developments connected with the implementation of the CBD have also resulted in significantly different approaches to the management of genetic resources (or more commonly biodiversity), in relation to rights to exploit them either as food or as commercial products [4]. What emerges in a meaningful way is that the

preservation of plant biodiversity is a process which is fundamentally linked to its use by the peoples most generally in contact with it. This clearly has very significant implications for all those species, varieties, accessions, and ecotypes of general nutritional interest, and which over the course of time have come to play a consistent role in the daily diet. However, the same can also be said for all those plant resources which are of medicinal interest, and which have been employed by custom and tradition as the natural solution for everyday problems, especially in rural areas cut off from the economic development which has characterised zones of greater industrialisation, and with greater access to financial resources, over the last hundred years.

The approach offered by the project, FAO GTF/RAF/426/ITA *Promoting Origin-linked Quality Products in Four Countries in West Africa*, has taken on its own unique character in this respect. Starting from the assumption that there is a very significant risk of loss of plant diversity, especially in the area of agro-biodiversity (biodiversity connected to food and agriculture), it studied the role that many plant species (indigenous or simply native) still play in the daily lives of rural populations far from urban areas, evaluating the risk of their loss and adopting forms of sustainable promotion which directly involve the local populations.

The geographical area now recognised by the name of West Africa presents a series of specific characteristics which point to a reality unique in many respects [5]. There is clear evidence of a strong divide between the urban and rural areas, but also of significant geo-political turmoil, and this affects the development and growth of cultures that are very diverse, even if physically very close together [6].

Without entering into the merits of the various geo-political events, which nevertheless have had a significant impact, it is evident that the link between this part of the African continent and plant biodiversity is incredibly strong. There are many species which originated in West Africa [7], a surprisingly high number if one considers the relatively small size of the area when compared to the other main areas of plant origin and domestication around the world. African rice, in addition to African groundnuts, certain species of banana tree, sweet potatoes and many species of leaf and root vegetables, and so on, were all first identified in this zone [8]; and such species were subsequently diversified and selected by the local peoples in order to make them suitable for direct consumption, or for use as ingredients in traditional preparations.

In this respect, there is a body of absolutely tangible scientific evidence, not just in terms of the classic categorisations of *vegetative wild relatives* or ancestral species, but also through more accepted methods of botanical archaeology which demonstrate how many varieties belonging to species of sorghum, millet and rice do indeed date back thousands of years in terms of their presence, diffusion and use [9].Clearly, all this did not occur over the course of a few years, but is the result of an evolutionary process originating from a concentration of different climates to which such species were adaptable, and reaching us today through the excellent system of conservation of biodiversity to be found in everyday consumption.

It was the very variability of climates within this large geographical area which enabled the significant incidence of genetic diversification in these many different plant species. From the Sahel to the Atlantic Ocean, one passes through desert zones, arid zones, and fertile lands of fluvial origin, until finally reaching tropical forests. Here, there are a huge number of indigenous species which have prevailed as a result of their adaptability and their exploitation for nutritional and economic purposes. In alluding to the variations in climatic environments and agronomic and cultural factors, we are in fact referring to macro-areas which do not fall within the political borders which define the individual states [10].

The climatic areas and plant biodiversity

The *forest area* represents just a portion of the vast and varied rain forest system. The presence of a large variety of species with arboreal growth habit has led to many of these being widely cultivated. In Sierra Leone and Guinea Bissau, for example, palm oil, rubber from indigenous trees, cocoa, but also timber from various types of native tree, together with many other plant species, have played an essential role in the economic, cultural and social development of these areas.

The oil palm, for example, has always been a species of great indigenous interest for it oil and for cosmetics, obtainable by means of a rudimentary tree-tapping process. Traditional alcoholic beverages can be made from the trunk, and the leaves and fronds provide useful building materials and are primarily used for roofing houses. All these applications, therefore, account for the widespread use of this species in many West African countries. However, palm oil first became successful on an international scale with its export to Britain near the end of the 18th century, for its use first in industry and then in food production. Palm oil subsequently began to be exported to very many countries, attracting a lot of industrial concerns, and these ended by subverting the production techniques developed over many years by the indigenous populations. Not much remains of this original production, although some of the traditional palm groves have still been conserved. Here, you can still find a form of sustainable management which uses traditional cultural techniques and follows indigenous rules, both for the maintenance of the plantations and for the production of the palm oil. These areas represent just one example of what was once a form of production closely linked to the traditional cultivation of a species which was naturally and widely distributed throughout the forest zones of this large corner of the African continent. A similar story in some respects relates to the production of rubber from widely diffused native species. The peak of production follows, to some extent, the growth of the palm oil trade, at least until the end of the 19th century. However, there never existed formal plantations for the production of rubber: the local people just profited from a long period of commercial demand, collecting the product from the trees found spontaneously growing

around the forest.

Many of the areas where oil palms could be found, or trees from which to extract rubber, were heavily exploited during the period of greatest trade and remained partially deforested or at least much beaten down. It was precisely in these areas that the development of cocoa palms became possible, and there was an immediate increase in the number of these plantations. It was the introduction of cocoa, reaching West Africa in the second half of the 19th century, which significantly altered the agro-environmental landscape, with plantations growing in number and encroaching ever further into the rain forests. Amongst other, more minor species, meanwhile, there was also a culture of coffee growing, which played quite a significant role although never reaching the levels of cocoa or palm oil production. Nevertheless, apart from various scattered and not very widespread fruit trees (pineapples, bananas, mangos, etc.), it is the cola tree which represents the most important species in terms of the link between indigenous cultivation and the forest. Cola nuts, traditionally collected from the trees scattered around the forests, from Ivory Coast to Sierra Leone, still act as a strong link between local traditions and the sale of plant products. They are used generically as stimulants by the people of the savannah and those living closest to the desert areas and have always been restricted to a relatively local trade, without ever finding space on more distant markets. Due to this limited diffusion, the traditions related to the gathering and processing of cola nuts have continued up to today. This is mainly thanks to the constant activity of the women, who have helped to maintain interest in this purely indigenous product, even if only at a local level.

Finally, in the typical forest areas, can be found a small number of species more directly linked to the diet of the indigenous population: mainly types of tuber (cassava, yam, etc.), and some trees such as the plantain. What is striking above all is the capacity of the women to profit from a range of spontaneous species whose tubers or leaves offer significant nutritional characteristics (in some cases, also medicinal), and which have come to form part of the daily diet of rural communities living in villages on the fringes of the forest. These forest areas become a source of edible species which prevail over those typically related to commerce and trade, emphasising the importance of the use of spontaneous, indigenous forms of biodiversity for the purposes of daily sustenance. This is really the very best form of conservation. However, it is also clear that forest zone is of lesser importance in terms of the species used in everyday nutrition, especially compared to the savannah region, to which the forest gradually gives way.

The *savannah*, as we have noted, is not an area uniformly spread throughout West Africa. It begins as very fertile territory, especially when close to river basins, and extends towards the Sahel with a succession of pedoclimatic zones which range from the humid to the very arid. The types of indigenous species to be found in these environments vary radically, as do the systems of agriculture and different methods of cultivation. There is widespread livestock farming, while rice, in the form of a native variety related to *Oryzaglaberrima*, is grown throughout the area and represents the staple food of the local populations.

The savannah of West Africa, during the time from the 18th to the mid-19th century, contained within it a vast array of very different species, some of which played a crucial role in the rural economy of the age. One of the crops with the greatest tradition and firmest links to the rural culture of this area was therefore rice, and this region was known at the time as the "*rice-growing belt*": a zone stretching from Casamance in Senegal to as far as the Ivory Coast.

However, within the Savannah, the ever greater scarcity of water resources and the alternation between very dry and very wet seasons, has become a very important factor in the selection of species and cultures which over time have become well established and have become essential to the nutrition of the local populations, especially the rural communities. Despite the fact that the continuing industrialisation of agriculture in Sub-Saharan Africa has contributed to the ecological degradation and impoverishment of the territory, there nevertheless still exist certain characteristic species in this area from which the indigenous populations derive a large part of their income, as well as, more importantly, a large part of their nutritional needs and sustenance. Indeed, the cultivation of groundnuts has been consistently important in West Africa, with some significant specifications. Until colonial times, the cultivation of groundnuts involved native and indigenous species: the *Voandzeiasubterranea* also known as *Vignasubterranea*, and whose common name is *Bambara groundnut*, originated in West Africa, probably in northern Nigeria, where it was first established as a distinct species. It was only with the arrival of the American groundnut (with a completely different use and purpose) that the *Vigna* began to diminish in importance. However, it still remains an important, basic species, especially in rural areas with a prevalence of subsistence agriculture, and is closely linked to the preparation of traditional dishes. There is no doubt that this species, with its special nutritional and dietary characteristics, especially in terms of its content of protein and high-energy oleaginous fats, has been an essential element in the diet of indigenous people, from Senegal outwards: also because it is easy to store. There have been many ethnic groups involved in its production over the years, from the Wolof in Senegal to the Bambara in Mali, who cultivate groundnuts in their fields alongside the traditional millet or cotton. This provides these people with an important sort of agronomic and economic "flexibility", which at certain times proves vital in helping them to overcome specific hardships.

Indeed, the West African savannah is a concentrated area of production for millet, sorghum, maize and rice, which, almost exactly in this order of importance, have represented a productive system of agriculture as well as a basic nutritional system. To a lesser extent, durum wheat is also grown, but principally many and varied types of pulses. Since their growing season intersperses with that of cereals, they can be used to enrich the diet of the local people as well as helping to maintain the fertility of the soil by fixing nitrogen through their roots. It is, in any case, fascinating to observe the differentiation of species their variety according to the specific climatic conditions of the savannah. The alternating wet and dry seasons make it necessary to cultivate varieties with short growth cycles: varieties able to use the end of the dry season for germination and harvesting, and also capable of withstanding the limiting conditions

imposed by the aridity of the period which immediately follows. Where conditions have permitted small artisan systems to be established for water management and irrigation during the dry season, the cultivation of vegetables, tobacco and rice has proved to be extremely fertile and productive.

Rice has always played a fundamental role in Sub-Saharan Africa. Until the introduction of Asian rice (*Oryzasativa*), all the varieties spread through in Africa, and in the western part in particular, were descended from *Oryzaglaberrima*, a native, indigenous rice variety which provided the essential staple for the local populations. These varieties of rice were used for a multifaceted form of cultivation, from the classic paddies to rice fields on dry hillsides, and from areas with high salinity in the middle of mangrove swamps to the "floating" varieties, with their long stems and short growth cycles: proving in a definitive way the huge genetic variability of this plant and its great adaptability to environmental conditions.

Over the course of the decades, while Asiatic rice has come to dominate in peri-urban agriculture, due to its larger yield and consistency of production, the rural areas have consistently maintained their cultivation of *Oryzaglaberrima* and its different varieties managed by local farmers. Between the 1960s and 1970s, Porterés observed a considerable number of native African rice varieties, identifying just a few morphological differences between them, which were mainly related to the size and colour of the paddy. At the same time, he described their agronomic characteristics, emphasising, in particular, their high resistance to fluctuations in water level [11] [12].

In some rural villages, therefore, the native rice still plays an important role, and the few varieties that come down to us today have been maintained primarily because they are always grown together. Indeed, one very well-established tradition is that different varieties of rice with different characteristics should always be grown together in the same fields, as a way of guaranteeing production even in the event of unexpected adverse conditions which could affect any variety: a rare and also very efficient method of protecting and conserving biodiversity. This strategy is implemented largely due to the expert knowledge of the local women, who are able to distinguish the different cultivars just from the paddy, and therefore know how to create the right mixture at the time of sowing. Their choice, therefore, is based on different types of adaptation to the soil, or resistance to adverse conditions, and acts as a useful instrument which contributes to the movement of varieties from village to village. Indeed, these women exchange seed with the women of other villages so as to ensure the maximum morphological and agronomic diversity between the seed types they intend to sow [13].

The significant genetic erosion of native African rice largely took hold after the 1960s with the start of a real and prolonged period of drought, which, combined with a pronounced population increase, led to a need for rice imports. Apart from a few brief periods, average rainfall decreased by a third - and in some years even by half. It was therefore thought necessary to rely on varieties with very short growth cycles, which would not grow excessively high and would maximise yield in the shortest possible period. For this reason, Asiatic rice became increasingly widespread, while at the same time research programmes were launched by African and European institutions to try to develop consistent improvements to varieties by combining the genetic characteristics of *Oryzaglaberrima* with the high yield of *Oryzasativa*.

The role of women in the conservation of biodiversity

It is interesting to note how, in this context, the different roles of men and women are perfectly balanced: the men till the soil and sow the seeds, while the women harvest the crops, select the product, and maintain diversity by deciding what should be kept for the next sowing and in what proportions. Paradoxically, this part of the world has become one in which this sort of balance and form of relationship has assumed increasingly differentiated connotations. On the one hand, this form of equilibrium is still very much alive and rooted in the indigenous social culture of outlying rural communities: especially those remote from cities. But on the other hand, in many urban areas close to zones of expansion and colonial domination, this system of balance has profoundly changed, and women especially have lost the valuable and decision-making role which they have always traditionally played within the African family. This aspect alone helps to highlight how, and to what extent, colonialism helped to set in motion and then to consolidate a series of social and political changes, with a consequent impoverishment which has not yet been put into reverse, and with a succession of *coups d'état* and periods of political and economic volatility which have certainly not promoted social stability.

The indigenous peoples - and women in particular - have been the most significant victims. Their communities were the ones that best preserved the biodiversity: that biodiversity of which there was once an inexhaustible supply in West Africa. For all these reasons, the rural areas furthest from the cities and large centres of population have somehow managed to counteract this trend towards impoverishment. Indeed, they have assumed the role of guardians of a significant part of this native and indigenous heritage, and have become living proof of the traditional ways and knowledge: factors which have so often helped the indigenous peoples to overcome major problems in relation to sustenance, and to political and social issues.

The colonist, in fact, were never very accommodating to changes in their own customs, instead exerting heavy pressure on the local traditions by the importation of new species, new habits of consumption and new approaches to everyday nutrition and diet. Nevertheless, as in other parts of the world, and especially in developing countries, these African women remain the repositories of that essential knowledge on which the sustenance and nutrition of the whole nuclear family depends. The women know where to go in the forest, and how to collect the leaves, stems and roots of

plants. They know how to recognise them, and to cleanse them of any alkaloids or dangerous substances. They know how to mix them together to make a complete meal, or to provide the ingredients for a useful and nutritious dish. Indeed, apart from certain cultivated plants, wild herbs almost always form the basis of the most traditional African recipes.

THE PROJECT ACTIVITY

The implementation of the project, *Promoting Origin-Linked Quality Products in Four Countries*, has enabled the creation of a sizable inventory of the species, varieties and types of plants associated with the traditions of the local people; selecting as case studies 4 West African countries characterised by the great richness of their biodiversity. On the basis of knowledge of the region, and by building up a dialogue with the local people, it was possible to draw up a substantial inventory, which could be exploited by applying the special methodology developed by the Slow Food Foundation for Biodiversity. It was aimed at promoting those products related to traditional history and culture: products with a high organoleptic and nutritional value, of either native or indigenous origin, which were habitually collected by women and so handed down the generations.

Starting with these types of products, a process of investigation, assessment and selection was then carried out. This was aimed at establishing various projects to evaluate at least one product per country, and envisaged the direct involvement of small producers, local farmers, and expert women involved in the preservation of such knowledge. This could form the basis for a demonstration exercise for the rural populations, leading to the creation of small scale but very viable economic systems.

An evaluation process was established, aimed at exploring markets able to enhance the value of products originating from very particular areas, and a system was developed to promote knowledge of “local eating” in two parallel ways. This involved working firstly in the villages, to emphasise the importance of local foods, their consumption and nutritional benefits, lending added value to products once considered exclusively poor; and secondly in the large cities, where contact with local production risks becoming more and more sporadic, and loss of knowledge risks opening the door to increasing genetic erosion and loss of biodiversity.

The specific aims of the project can therefore be summarised as follows:

- to promote all initiatives aimed at the conservation of biodiversity and local traditions, by identifying those products associated with indigenous history and culture in 4 West African countries (Sierra Leone, Guinea Bissau, Senegal and Mali).
- To apply the evaluation system of the Slow Food Foundation for Biodiversity, using the criteria for various products and selecting those suitable for developing a Slow Food protection project in each of the 4 countries;
- To help develop a small-scale production organisation in relation to the local social and cultural hierarchies and structures, and to contribute at the same time to improving (where possible or necessary) the production techniques related to agronomy, health and hygiene, and also to the packaging of the final product.
- To promote and improve access to these products in local markets, within the individual countries involved, and on an international scale.
- To improve the knowledge of the local population with regard to native and indigenous products; to the importance of their consumption; to the link between their consumption and improvements in nutrition, the conservation of biodiversity and an increase in environmental sustainability, and, in short, all the befits which derive from these various interconnections.

The case studies – the 4 West African countries

It is difficult to speak exclusively of one or other of these countries without referring to the larger geographical zone (i.e. West Africa), since biological evolution is certainly not defined by political borders. Indeed, it is abundantly clear that the entire region has undergone a similar process of evolution in terms of the domestication of plants, the development of agriculture and the close relationships with local traditions in the rural areas. A study of the region reveals a strong link between dietary traditions, closely connected to a huge variety of products, including species from the vegetable plot, types of fruit, cereals, and especially pulses. Sweet peppers, tomatoes, aubergines, cucumbers, beans of every type, different forms of tuber, and species of tropical fruit-tree and palm-tree are all traditional features of the West African landscape. Many of these products are also linked to the distant past, both in terms of their cultivation in the different countries, and because of their associated use in preparing dishes of varying complexity, or in a range of processes after harvesting.

The obvious geographical isolation of the rural areas has certainly impeded economic and social development, but has also substantially helped to conserve an unparalleled cultural and agricultural heritage. One can still witness the preparation of so-called “poor” dishes; the result of the harvesting and combining of ingredients derived from wild species or traditionally cultivated plants. The skill of the village women in selecting wild plants for use in cooking is still a source of amazement today, and confirms the existence of a repository of extraordinarily valuable knowledge. This is an asset to be explored, studied and disseminated in order to help maintain a culture of local consumption: a

culture of sustainable consumption which encourages biodiversity and enhances the social fabric.

It therefore seems clear that in order to implement a process of reviving and enhancing plant and animal biodiversity – that same diversity that is ever more closely linked to local consumption in marginal areas - one must inevitably undertake a process of investigation, monitoring and cataloguing, of studying and researching the different plant species and varieties [14] [15]. It was from this perspective and with these specific objectives (as noted previously) that the present study was conducted, using certain specific activities which led to the identification of products with very strong links to their areas of origin: products of great prestige, characterised by a history firmly rooted in local traditions, and with significant connotations in regard to the nutrition and sustenance of the indigenous populations.

The methodology

The activity envisaged in the project, '*Promoting Origin-linked Quality Products in Four Countries*' (GTF/RAF/426/ITA), was divided up into a number of stages, entailing detailed bibliographical work, and a series of visits to the 4 countries involving many contacts with local personalities, farmers, small producers, shopkeepers and local officials. This method allowed the project team to identify and learn about various products of significant local interest in terms of food, including those which had been subjected to processing. According to the project plan, the evaluation of the various products had to be subject to a checking process, involving a series of criteria used by the Slow Food Foundation for Biodiversity in relation to the programme leading to the establishment of Presidiums.

In the context of this project, the process divided into four different phases:

- *Inventory*: The creation of a list of local products with related data sheets. This list was planned to be wide-ranging and thorough, and took account of information collected in situ; through interviews and meetings with small producers and inhabitants of rural villages, exchange of knowledge with people from various countries, and from institutions which carry out carry out cooperative activity and sharing of expertise at a local level. The information obtained was then put together with the evidence acquired from extensive bibliographical research, involving both the science of agronomy and sociological, archaeo-botanical and geopolitical aspects.
- *Selection:* This involved the list of criteria for creating a Slow Food Presidium. Each product identified was given an in-depth description and related data sheet, and then evaluated using the criteria established by Slow Food for accessing the Slow Food Presidium programme. This process helped to highlight the strengths and weaknesses of the product in terms of its potential for development and its contribution towards the conservation of local resources.
- *Presidium Project*: Together with all the local players involved, this entailed a process of development for those products which met the criteria for Slow Food Presidiums (http://www.slowfoodfoundation.com/presidia). This action plan began with an assessment of the potential of each individual product in terms of the safeguarding of cultural, social and natural resources, and also in relation to the economic development and involvement of consumers and of the Slow Movement network on the spot.

RESULTS

A data sheet was created for each of the local products identified, and this was used to evaluate possible successive action. In this way, an inventory was produced of about 50 traditional products from the 4 West African countries. These were products of either native or indigenous origin which have an important role to play in the agronomic, social and cultural life of these 4 countries. This list certainly does not exhaust the full potential of any of these countries, and it can be gradually expanded as the increase of the association's activities within the country leads to a spread of the Slow Food philosophy and a consequent highlighting of products of interest.

The inventory forms part of a clear strategy, whose aim is to develop a virtuous circle based on the promotion of good quality, traditional products. Each data sheet contains a large quantity of information in relation to the botanical identity of the product, with detailed facts regarding the origin and distribution of the particular species or variety. It also includes data in relation to its prevalent use and main characteristics in relation to food preparation, diffusion throughout the territory, possibilities for commercialisation, and all aspects of its nutritional value. Each product is then subjected to an evaluation process based on the selection criteria for the Slow Food Presidiums, to check whether it possesses the requirements to access the promotion stage, in line with a process already tested in many countries and every continent. This results in a selected list of products with suitable characteristics for the Slow Food programme (bottom-up type micro-interventions). This list can be included in priority series of interventions, enabling the identification of possible actions to propose to financers at the time when the Slow Food Foundation for Biodiversity is in a position to propose and set up new projects in developing countries.

The products chosen at the end of the evaluation phase are those which succeed in fulfilling all the criteria mentioned. The Somè Dogon Presidium products, which met these conditions, were not considered because they were already the subject of a Slow Food project following previous activity by the Foundation in West Africa. The **Cola of**

Sierra Leone, the **Palm oil of Guinea Bissau**, the **Salted millet couscous of Senegal** and the **Kattapasta of Mali** are, on the other hand, products which managed to fulfil all the necessary criteria of the rigorous selection process. These products, therefore, have now embarked on a process of development and promotion, calling for the full involvement of the small producers. They are products which have fulfilled all the conditions required for setting up a Slow Food Presidium, in relation to small-scale production, quality and good taste, sustainable systems of production and management, and risk of extinction for the product of production system. Each Presidium is equipped with production guidelines, drawn up by joint agreement during a moment of social interaction between the producers, who had the opportunity to present their various products at the Terra Madre 2012 international event.

CONCLUSIONS

As already noted, plant species in the rural areas have been able to maintain real diversification, somehow integrating the production of rice, maize and tubers as well as fruit and vegetable products, in addition to an increase in livestock and dairy farming. All this is partly related to farming enterprises developing next to family concerns, but without the presence of proper agro-food businesses.

In general, the agro-food market in West African countries lives in a state of constant antagonism between a timid defence of local production and small producers and a growing interest in importing products from abroad, both from other African countries and from the EU. In this way, various bodies and action groups have been established with a protectionist attitude to indigenous production, and these have been opposed and often impeded by those concerns which manage to import and distribute foreign products with considerable ease [16].

There is therefore a very conflicting situation: on the one hand, the increase in imports reduces the costs of food products, increasing their ready and constant availability, but also causing fierce competition, without any of the guarantees offered by local production. On the other hand, activities to protect and promote local products certainly cannot see any chance of success in the immediate future, but require a prolonged programme of information, research, and the sharing of experiences and skills. All of this must be directed towards reviving awareness in relation to the importance of a healthy, balanced diet, based on local products which require less energy input for their production, with a consequent increase in agronomic, social and economic sustainability.

In these social contexts, the opportunity to implement activities aimed at the conservation and promotion of biodiversity, as through the Slow Food Presidiums, seems to be of great importance not just for purposes of conservation, but also because it is by the diffusion of information about the consumption of indigenous plant products that one can more practically achieve the general aims of the rural communities [17].

The great pressure to which this biodiversity is subjected every day, quite apart from any connection to the period of European colonisation, depends heavily on an ever-growing demand for food, and the need to satisfy it within certain timescales and in sufficient quantities. Indeed, local production is not characterised by very high yields, but often (or rather, almost always) responds to the needs to resist constrictive climate conditions, and the ever-present threats of biotic or abiotic stress, while also demonstrating an unequalled nutritional capacity. A demonstration of this is the increasing activity in the field of genetic enhancement, which, independently of the methods employed or the parent strains used, has had a wide-reaching effect in quantitative terms, while also leading to an impoverishment in the nutritional potential of various foods and a growing risk of genetic erosion amongst plant species [18].

The work carried out by the project, '*Promoting Origin-Linked Quality Products in Four Countries*', was aimed at highlighting the approach of the Slow Food Foundation for Biodiversity with regard to local products and traditions, and the process of selecting and creating a Slow Food Presidium in an area as complex as the one under review in West Africa. The innovative aspect of the approach adopted by the Slow Food Foundation for Biodiversity consists in creating relationships which do not involve a one-way connection between the project developer and the beneficiary but which are instead circular systems. These are systems where everyone, by contributing to the creation of the activity, becomes one of its beneficiaries, and where even small producers become main players in enabling the success of the project. In such a context, there is no contradiction between the actions of the individual and of the community, for they both benefit from each other within a network of generally positive relationships. Indeed, sustainable production does not only benefit the individual who puts it into practice, but also the entire community who live with and consume these products. In the same way, being part of a community allows the individual producer who works, for example, in marginal areas, to overcome the restrictions imposed by physical isolation which made it hard for him to access and compete on the market. In view of these considerations, it is possible to underline certain key points in the model for the Slow Food Presidium Project, which has provided a means of integration and consolidation in both West Africa and other parts of the world:

- in varied parts of the world and with very different products, it has managed to apply the same basic operational formula, even though it had to adapt the specific action to the context involved;
- the implementation of these activities, like their support and control, is ensured by a cooperative structure on the spot, and by the presence of a community which shares the key values of the SF philosophy and which does not therefore require the presence of ex-patriot personnel on the ground;
- the Slow Food movement and the Terra Madre network promote the spread of their philosophy through the

creation of a relationship of circular exchange between the various individuals who form a part of it;
- there is continuity of the activity over time, in that the SF network allows an indefinite life and visibility for the project, with no determined end to the operation, in that it makes up an integral part of the SF system.

Using this approach, the movement has operated in West Africa, reaching the end of a process of evaluation which has allowed it to come into close contact with the rich legacy of native and indigenous plants which is still present and still used, although sometimes at grave risk of extinction due to the constant pressure of foreign products. The rural communities have managed to put up a strong defence, but now recognise the importance of projects able to give voice to their skills and knowledge, applied to the use of the biodiversity which they know how to value and recognise. Valuing and promoting this legacy through projects which put the indigenous people at centre stage and make them masters of the success of their enterprise, has also proved to be a winning formula in relation to preserving the agro-biodiversity still in existence today.

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LOCAL FRUITS AND NUTS AS A TOOL FOR THE DEVELOPMENT OF AFGHANISTAN

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ABSTRACT

The Perennial Horticulture Development Project – Afghanistan (www.afghanistanhorticulture.org) funded by the EC-EuropeAid Program since 2006, is supporting the Ministry of Agriculture, Irrigation and Livestock of Afghanistan in the sector of fruit culture, including the fruit tree nursery segment, through a process of collection and selection of local fruit varieties. The main goals are the strengthening of the perennial horticulture through the utilisation of mostly local and imported genetic resources and the development of a consistent private commercial nursery sector. About a thousand fruit varieties (of grape, almond, pomegranate, apricot, etc.), selected by local advisors across a wide area of Afghanistan were collected during the first phase of the project (2006-2010), propagated and planted in National Collections at six Perennial Horticulture Development Centres. The collected accessions are under morphological characterization and evaluation following standardized methods in order to choose the best ones and to allow their registration in a national list, hence contributing to their safeguard and protection. Many varieties are already being cultivated and are also being used for adaptive research in order to point out the best cultural practices (e.g. pruning, training). PHDP also provides capacity building at technical and institutional level, fosters the establishment of nursery sector associations and helps to provide international expertise for local staff in cooperation with local and foreign universities, and NGOs and other public and private companies working in Afghanistan are also involved. One of the most challenging tasks is to promote, tutor and bring to sustainability the Afghanistan National Nursery Growers Organization (ANNGO) and the apex Afghanistan National Horticulture Development Organization (ANHDO), mainly concerned with value chains.

FOREWORD

This paper aims at illustrating the activities of the Perennial Horticulture Development Project (PHDP) and placing them within the framework of the economic development of Afghanistan. The description of the project and the related considerations will be performed by keeping in mind the leading question of the Section "Rural development, natural resources and environment - 3.2 Agro-biodiversity and diversified agro-husbandry systems" of this Congress, which states "the integration between scientific and technological innovation and traditional knowledge and use of local genetic resources: how to promote capacity building and technological transfer taking into account these aspects?".

INSIGHT AFGHANISTAN

This section briefly describes the country's background and those aspects directly related to the PHDP activities, focused as they are on the development of fruit culture sector.

Historical, cultural and institutional background

The 5,000 year history of Afghanistan can be defined as a continuous overlapping of conquests and defeats by neighbouring countries and civilizations which have lead to a variegated and multiethnic nation. The current conflicts go back to 34 years, and have deeply affected people and their relationships both within and between ethnic groups. Even if the war had tragic effects in the countryside, the rural cultural heritage and social structure could stand these events better than towns, where, most of the governmental structures (e.g. Ministry of Agriculture and Universities) practically collapsed, leaving a void in the institutions demanded to manage and promote, for instance, agriculture, the leading sector of the economy of Afghanistan. The destruction of buildings was closely accompanied by the almost total annihilation of human resources, with a whole generation of people missing out on education and social and economic development. Another effect of the conflicts was, notwithstanding the wide *diaspora* of Afghan citizens, the isolation of this country towards the international community in most of sectors of public and private activities. Hence material rehabilitation and human capacity building are still a must in Afghanistan.

Environment and agriculture

Afghanistan has a surface of 652,230 km2, two thirds of which are represented by mountainous terrain and dry plains with little or no vegetation. Good statistics are impossible to come by, but of the total 65 million ha only 12% is ever cultivated, as most of the land is too mountainous to cultivate, and much of the rest of the land receives too little rainfall for rainfed crops. Of this approximately 8 million ha of cultivated land, only about 2 million ha is irrigable currently; although many irrigation schemes could be improved or extended. Water for irrigation is generally derived from precipitation as snow at high altitude in the winter. Where water courses are fed directly from melting snow, the irrigation capacity decreases during the summer as snow melts. More consistent aquifers are available from groundwater areas, and a limited number of dams were built going back as far as the 1950s. High mountain chains (e.g. the Hindu Kush) separate usually narrow valleys with specific microclimates, each one with diverse typical fruit varieties. In the central and northern parts of the country, the climate is harsh, with very cold winters and very hot, dry and in many areas windy summers. Nevertheless a wide range of temperate species are adapted to these conditions and are grown from 250 m up to 2-3,000 m above sea level. In southern areas, winters are milder, and in parts of eastern Afghanistan, which are on the edge of the areas influenced by the South Asian monsoon system, many citrus and similarly tender species can be grown. Over 75% of the Afghan people live in rural areas where agriculture is the primary activity and the agriculture sector contributes about half of the GDP of the country. The World Bank estimates that to enable faster economic growth and rural poverty reduction, agriculture needs to grow at least 5% per year over the next decade. This is a big challenge since technology, communication and transport, irrigation, and education are substantially deteriorated due to conflicts and lack of maintenance. Both public and private institutions lack the physical infrastructure, the necessary regulatory framework, and the skilled staff to build a modern and competitive agricultural sector.

Fruitculture

The strategic position of Afghanistan in the crossroad between western and eastern regions, which motivated the repeated conquests and re-conquests of that country by different civilizations, explains the presence and the wide diversification of most of temperate fruits species originated in Middle East, Central and Eastern Asia. Many historical and artistic records indicate a strong traditional linkage between the Afghan people and fruits (fresh and dried fruits, and nuts) [1]. For instance, Qasem Ebne Yousof Abunasre Herawi, in his “Guide to agriculture” of the XIV Century, quoted over 100 types of grapes for the area of Herat. Fruits trees are very often recalled in present literature; some nice examples related to pomegranate and pistachio trees can be found in the popular "The Kite Runner" [2] and "A Thousand Splendid Suns" [3] novels of Khaled Hosseini, while "I fichi rossi di Mazar" (*The Red Figs of Mazar*) is the title of a recent book by Mohammad HussainMohammadi [4]. An interesting Italian reference, where fruit trees are cited, is "Nel mare ci sono I coccodrilli – Storia vera di Enataiatollah Akbari" (*In the Sea There Are Crocodiles*) by Fabio Geda [5], based on the candid testament of the experiences faced by a young asylum-seeker from Nava (Afghanistan). These are sound proofs of how much fruits are a part of Afghans everyday life and how deeply they are linked to their cultural heritage. The “*bagh”* is the typically closed home garden where a wide range of species and varieties (often obtained directly by seed) are grown and from which many local varieties, composing the fruit germplasm of Afghanistan, came out. More specialized mono-specific orchards are also called *baghs* and they supply most of fruits and nuts, nevertheless also sparse trees in community areas are a valuable source of some nuts like pistachios and seldom "wild" pomegranates. Afghan consumers prefer very sweet, extremely low acidic and tasty fruits; high sugar content is a necessary condition for drying fruits, a very popular and traditional practice in Afghanistan, which is facilitated by very hot and very dry air during windy summer times. As a matter of fact, storing dried fruits and nuts represents a suitable strategy to overcome harsh winters with a natural and healthy source of energy in the rural areas. Fruits represent for the Afghan population a valuable product both for subsistence and profit. Fruit and nut production in 2011 reached 1,355,985 t [6]; the actual amount could be more, since the statistics on production are not always very reliable. The percentage of "fruit and nut production on total crop production" in Afghanistan is over 16%, which is quite high if compared to world average (about 11%), and lower than the proportion of Italy (about 30%), considered a typical fruit producing country. The following table 1 gives a picture of the species cultivated in Afghanistan and their relevance in the sector. Global fruit production yield in Afghanistan (6,7 t/ha) is about half of the Italian value; the most unbalanced situations are presented by apple production (the Afghan yield is about 15% of the Italian one) and then by peaches and nectarines (38%) and apricots (50%). These figures are evidencing problems in terms of fertility, production systems and cultural practices. Insofar as these yield figures are reliable, they are also influenced by the average age of the orchards, after a lot of orchard planting in the last few years. One aspect of major concern for fruit industry in many developing countries is related to the nursery system, the starting segment of fruit production chain. A strong impulse to top quality fruit production in developed countries of the last decades was the adoption of high quality propagation material, characterized by true-to-type genetic identity, clean phytosanitary status and high technological properties. Traceable propagation material (such as buds, cuttings and saplings) released by a nursery sector working under a certification-filiation scheme is a guarantee of quality for fruit growers. At this regards Figure 1 clearly illustrates the potential effect of the application of a nursery system based on traceability on the orchards of Afghanistan, characterised by poor quality, mixed and often un-indentified trees. The limited natural

resources and the high population growth rate (average of 3,2%, against 1,2% of world in the last ten years) of Afghanistan, impose to adopt innovative strategies in agriculture (and namely in fruit culture) in order to increase yields in general terms, and, at the same time, to improve the marketability of fresh and dried fruits, and nuts. At this regard, it is worth to notice that Afghanistan is a net exporter of grape and raisins (≈ 48,000 t in total), pomegranates (≈ 50,000 t), fresh and dried apricots (≈ 8,000 t in total), then dried fig, pistachios, etc. (FAOSTAT, 2013; Saeedi *et al*., 2011), while is a relatively strong importer of citrus (≈ 120,000 t). Increasing and improving production will answer to country's growing demand of fruits, will promote export and reduce import.

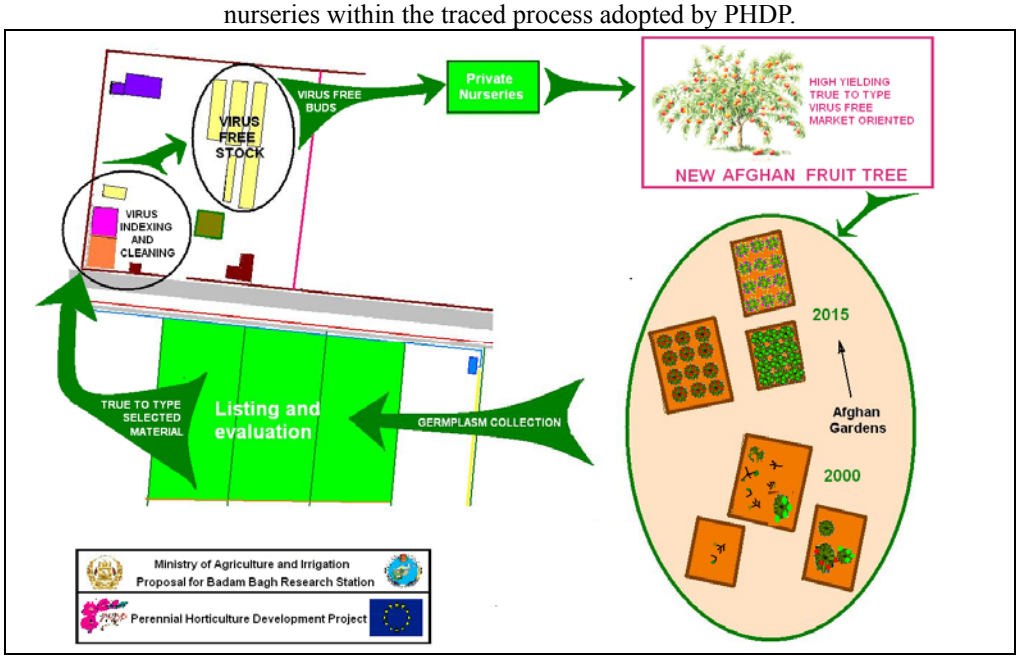
Science, technology and institutions

Each important town of Afghanistan has a university with a Faculty of Agriculture; the authors of this paper have direct contacts with the Faculties of Agriculture of Kabul, Herat, Nangarhar Kunduz and Mazar Universities. Unfortunately the universities greatly suffered the effects of conflicts, the organisation, content and quality of the courses are still far away from the international standards. The causes of this disparity are essentially the lack of financial support (also for physical re-building and payments of salaries) and, with some outstanding exceptions, a generalized very poor human capacity. As a consequence the development of basic and applied knowledge and technology is very poor. Universities in Afghanistan are not considered to have any research function. Similarly, public institutions devoted to manage, promote and develop agriculture (and namely perennial horticulture) need to be supported in order to foster their concrete and active rehabilitation and assume the role they are expected to have in society. As a matter of fact, the few regulations existing for agriculture (namely fruit culture) are not applied following standardised procedures and "certificates" are in many cases almost merely bureaucratic documents.

Tab. 1 - Fruit production of Afghanistan in 2011 (FAOSTAT, 2013; other sources).

Species	Amount (t)	Amount (%)	Species	Amount (t)	Amount (%)
Pomegranates	500000	36,9	Peaches and nectarines	13460	1,0
Grapes	411000	30,3	Oranges	7407	0,5
Almonds, with shell	60611	4,5	Pistachios (wild)	4203	0,3
Apples	59469	4,4	Pears	1596	0,1
Apricots	56043	4,1	Olives	1500	0,1
Plums and sloes	28406	2,1	Other fresh fruits	106946	7,9
Berries	24604	1,8	Other stone fruits	44713	3,3
Figs	19045	1,4	Other nuts	1649	0,1
Walnuts, with shell	13902	1,0	Other citrus	1431	0,1

Fig. 1 – From the traditional orchards of 2000 to the specialized orchards of 2015 established with saplings released by nurseries within the traced process adopted by PHDP.



THE PERENNIAL HORTICULTURE DEVELOPMENT PROJECT (PHDP)

Origin

In the 1990s, after the fall of the Soviet supported government in 1992, various projects supported the development of fruit tree nurseries and the introduction of many modern varieties of peach, plum, apple, almond, apricot, as well as rootstocks for apples. A leading figure in these efforts was Dr Abdul Wakil, one time Minister of Agriculture in the time of Zahir Shah, who led in the training of a large number of personnel in the basics of budding, grafting, orchard management and related skills. These trained people, mostly aged in their 50s by the time of the start of PHDP, were available to PHDP to staff the project and the NGO sub-projects. Other younger staff who had grown up and trained in Pakistan were also recruited.

The efforts included setting up mother stock nurseries and propagation of fruit trees at government research stations, which were managed by various NGOs for this purpose. This original concept of a limited number of key mother stock nurseries run on Ministry land informed the design of projects such as PHDP and also the World Bank (Emergency) Horticulture and Livestock Project (HLP), both starting in 2006.

Another initiative undertaken by PHDP that had never been done before, was the description of germplasm Physical collection of Afghan fruit germplasm was first done by PHDP from 2007. Some fruit germplasm collection done by FAO and ICARDA prior to 2006 was lost due to lack of records and lack of continuity in activities. A major centre of the germplasm description was in Ghazni, which has still not been accessed by the PHDP, due to security problems. This earlier work on germplasm description provided the PHDP with the possibility of recruiting one or other of the two persons with some experience in this work.

The FAO received a grant from Italian Cooperation for the restoration of the Afghan germplasm in 2002-2003. The project imported a range of apple, plum, peach-almond, quince (for pear), cherry rootstocks. These were planted in Kabul, Ghazni and Herat. By 2006, at the start of PHDP, the Ghazni materials were inaccessible, and the Kabul materials were denied to the project by the Head of Research at MAIL ("PHDP should bring in its own materials").

Following the funding of the FAO project by Italian Cooperation, the FAO staff approached the European Commission in regard to follow-on funding. The European Commission Delegation organised a feasibility study in 2004 focused on the development of the Ministry of Agriculture, restoration of the old mother stock nursery systems, with six nuclear stock nurseries, and some germplasm collection.

A report prepared during 2004 in Kabul identified the main subjects taken up by PHDP when it commenced in 2006. These main subjects included: a) *germplasm collection and nursery development;* b) *clean germplasm systems;* c) *provision of facilities for the development and testing of new varieties of and new growing systems of horticultural crops;* d) *training programmes for implementing agencies; training for senior extensionists/MAIL staff/farmers/traders; linkages between MAIL and universities;* e) *development of an integrated horticultural research and technology transfer system.*

During 2005, taking into account the Agriculture Master Plan [7], the objectives of PHDP were clearly defined in the overall scheme of a number of horticultural development projects. Basically, the actual design of the EC horticultural project was adapted to minimise the direct involvement of the MAIL in the production of fruit trees and in the development of mother nurseries, with the MAIL emphasizing to the maintenance of reference collections, research and extension production methods and regulation of the industry, backed up by appropriate analytical laboratories and an inspection and quarantine system.

Management and main objectives

In 2006 the European Commission-EuropeAid Program funded through a public/private consortium formed by IAK Agrar Consulting GmbH, AHT GmbH and the University of Florence-Italy the Perennial Horticulture Development Project (PHDP) (www.afghanhorticulture.org) in support to the Ministry of Agriculture, Irrigation and Livestock of Afghanistan (MAIL). A second phase is being supported by EC for the period 2010-2015 to a wider consortium (Agriconsulting SpA, Department of Agri-food and Environmental Science - University of Florence, Department of Agricultural Sciences - University of Bologna, Centro Attività Vivaistiche, Landell Mills UK) with the contract "Technical assistance to MAIL to strengthen the planting material and horticulture industry in Afghanistan (EuropeAid/129-320/C/SER/AF/2)". PHDP involved as an average four international permanent staff, ten short terms experts, and forty local staff, for about 150 man/months international and 630 man/months local staff. As stated in the project web pages “The specific objective of the project is to develop a demand oriented and export led perennial horticulture industry”. A major purpose of the project is to develop the nursery sector of this country in order to strengthen and to qualify fruit production. The main activities regard the establishment of a traced nursery system based on the propagation of true-to-type local varieties. The adopted steps can be summarized as follows: i) individuation of superior trees in productive orchards; ii) cataloguing and definition of the *in situ* National Collection; iii) propagation from the *in situ* original mother plants; iv) establishment of the *ex situ* National Collection; v) characterisation and evaluation; vi) foundation of traced mother stock nurseries (MSN). Such activity included also the establishment of six centres (the main one located at Badam Bagh - Kabul, the remainder in Herat, Jalalabad, Kandahar, Kunduz and Mazar-e-Sharif) and of a Laboratory of Biotechnology for plant indexing and micropropagation. PHDP workplan can be

distinguished into the following five components: 1. public and private sector institutional and regulatory reform; 2. national collection of fruit varieties and adaptive research; 3. nursery industry; 4. training and extension; 5. horizontal activities.

The concept underlying all the activities can be summarized with the call for a meeting with local nurseries and fruit-growers: *It is the intention of the PHDP to undertake various initiatives that create and develop a system that ensures the availability of the best possible planting material for the perennial horticulture industry in Afghanistan, and to ensure the long term sustainability of such a system owned by the private sector.*

Long term sustainability regards essentially the handover of the system built up by PHDP to the local staff of MAIL and of two organizations, the "Afghan National Horticulture Development Organization" (ANHDO) and the "Afghan National Nursery Growers Organization" (ANNGO) currently under temporary tutorship/supervision of international experts.

PHDP: MAIN RESULTS

PHDP has a quite long history; along the last 7 years relevant achievements were mixed to organizational problems in some cases due to safety issues, which threaten the positive development of specific tasks. The authors are describing here only some of the results more directly linked to the problematic backgrounds highlighted in the previous chapters.

The National Collection of Fruits and Nuts of Afghanistan

After the field surveys performed during 2006-2008, an *in situ* collection of over 850 accessions of different fruit species, selected by local staff with the participation of farmers holding the trees, was defined. The best and more "profitable" varieties were chosen together with fruit growers (who were recognized as “custodial” of the *in situ* selected accessions) to be propagated and planted in the 6 PHDP Centers in plots with mostly six replicates in the *ex situ* collections, which form the National Collection (NC). For each species, for security reasons, the NCs have been duplicated. The amount and location of collected accessions is reported in table 2. Most of the accessions were locally collected, with the exceptions of citrus, loquat and persimmon, donated by CRA-Centro di ricerca per l'agrumicoltura e le colture mediterranee - Acireale (Italy) and IVIA-Valencia (Spain), for which most of accessions have been imported since they were considered strategic for the development of fruit-growing especially in the area of Nangarhar valley (Jalalabad Province). Many varieties of cherry, peach, plum, apple and pear represent introductions in the last twenty years, or even more recently. Most apricots and almonds are of native varieties, and represent a valuable genetic resource not available elsewhere. Many grape and pomegranate varieties were also collected locally, but they are probably well represented in germplasm collections elsewhere, and many foreign varieties look to have more potential at first glance, due to lack of development of these species in Afghanistan. The NC represents the source of material to establish the Mother Stock Nurseries (MSNs) in different parts of the country. In 2009 the characterisation of accessions following standardized procedures (specific descriptor lists for each species) started and up to now around 70% of all collectable data have been gathered and input in a database by trained local staff. At present the description is going to completion and identification procedures started where necessary. Once this task will be finished, possibly also with the support of DNA fingerprinting, all the accessions will be registered by the MAIL of Afghanistan. The management and conservation of the NC will be in the hands of ANHDO (see next paragraph).

Tab. 2 - Amount of accessions in the National Collection of Fruits and Nuts of Afghanistan in the PHDP Centres.

Species	**Kabul PHDP Centre**	**Kunduz PHDP Centre**	**Mazar PHDP Centre**	**Herat PHDP Centre**	**Kandahar PHDP Centre**	**Jalalabad PHDP Centre**
Almond		98	100			
Apricot	125		118			
Cherry	26			28		
Peach				102	84	
Plum				77	75	
Apple	78	51				
Pear	42	50				
Grape				139	138	
Pomegranate					54	79
Fig					12	16
Loquat						12
Date Palm						6
Citrus						61
Total	271	199	218	346	363	101

The apricots of Afghanistan

A huge amount of different types has been gathered for each species. We report here some information on apricot, chosen as a representative case. Apricot varieties in Afghanistan are generally white fleshed (occasionally orange fleshed), generally sweet, with little or no acidity, frequently without "apricot" flavour (compared to Turkish or European/American types), but often with aromatic flavours like coconut, generally with non-bitter kernels, and generally self incompatible. The apricot types include the large fruited white fleshed types called Amiri, which are grown at higher altitudes, 2000 m +, are slow to come into bearing, and are represented by a small number of closely related varieties. PHDP has identified 15 Amiri accessions, which are similar in fruit and tree characters, and may represent many fewer varieties. The Amiri fruit is sweet, without apricot "taste", and can be dried to a pale golden colour with sulphuring. The dried fruit fetches high prices in Pakistan. The Amiri types replace all other apricots in the market once they start coming to the market. There are no early ripening Amiri varieties. Afghanistan also has several Shakarpara (meaning "a lot of sugar") types which are varieties where the small fruit is left to dry on the tree. There is no typical Shakarpara type tree among the many accessions in the PHDP collection. A third clearly identifiable type is the Saqi type, generally grown from seed only in the Bamyan province, and grown as large trees in pasture land. The fruit is used particularly for "chapanemak", where the seed is removed, and the apricot flesh is turned inside out before drying. The fruit are prepared and dried at home. The fruit is bright orange. The project collected four accessions from village trees to assess a best clone for multiplying by budding and grafting. Many other apricot varieties are available, but the names of accessions often refer to place of origin and relationships between varieties remain to be sorted.

The Laboratory of Biotechnology

A good example of capacity building is represented by the Laboratory of Biotechnology and its staff. During 2008, under the umbrella of PHDP, Aga Khan Foundation managed the project “Establishing Disease Indexing Services in Afghanistan”. The aim was to train the staff in Italy by the University of Florence, Bologna and by CAV, and to establish in Kabul a laboratory enabled to check the phytosanitary status of propagation material (namely the accessions of the NC and of Mother Stock Nurseries). Once built up the laboratory, the first step was to apply the standardized procedures to detect virus like diseases by ELISA tests, following the European Plant Protection Office standards. In time, some additional tasks were endorsed to this Laboratory (PCR based detection of disease and *in vitro* micropropagation). Among the most relevant results of such activity, it was assessed that no one of the accessions belonging to *Prunus* spp. resulted infected by Plum Pox Virus and that most of the material could be considered clean. This finding was useful to alert PHDP and MAIL, and indirectly all the international and local organisations importing plant material, in order to be accepted from abroad only virus tested certified propagation material. A special situation was afforded with citrus orchards, were Citrus Tristeza Virus was detected; these results were presented to the 22nd “International Conference on Virus and Other Transmissible Diseases of Fruit Crops” (Rome, June 3-8, 2012) by the staff of the laboratory and a related note was published [8].The Laboratory, unique of this kind in the area, is expected to perform phytosanitary and genetic analysis for public and private institutions. A similar record of internationalization is the participation of two field horticulturists to the II International Symposium on the Pomegranate (Madrid, 19-21 October 2011), presenting the status of Pomegranate industry and germplasm collection in Afghanistan [9].

ANNGO and ANHDO

PHDP developed a widespread network of public and private, local and international actors (NGOs, associations, nurseries, etc.) working in the nursery sector and in fruit-growing. As a result, it "covered" almost all the areas of Afghanistan involved in fruit production. For instance, the Afghan National Nursery Growers Association (ANNGO), partner with MAIL, ANHDO, PHDP2 and other organizations, represents 27 Nursery Growers Associations in 22 provinces; all the nursery members (more than 1,000) have voluntarily accepted the ANNGO regulatory system for planting material, so ensuring that the saplings sold to the fruit growers are true-to-type and traceable to Mother Stock Nurseries (MSNs) originated from the National Collection. Such material is constantly checked by the Laboratory of Biotechnology of Kabul. Business improvement and marketing promotion; sanitary controls; monitoring the quality of planting material; improvement of nursery techniques, production of clonal rootstocks; certification and inspection services including labeling of certified saplings; technical training and dissemination of innovations and publication of the catalogue of true-to-type saplings produced by NGA members, are the main services provided by ANNGO. In 2012/13 about 1.8 million of certified bud were sold to nurseries and 900.000 certified saplings were commercialized in Afghanistan and in neighboring countries. Figure 2 shows the distribution of MSNs and NGAs covered by ANNGO.

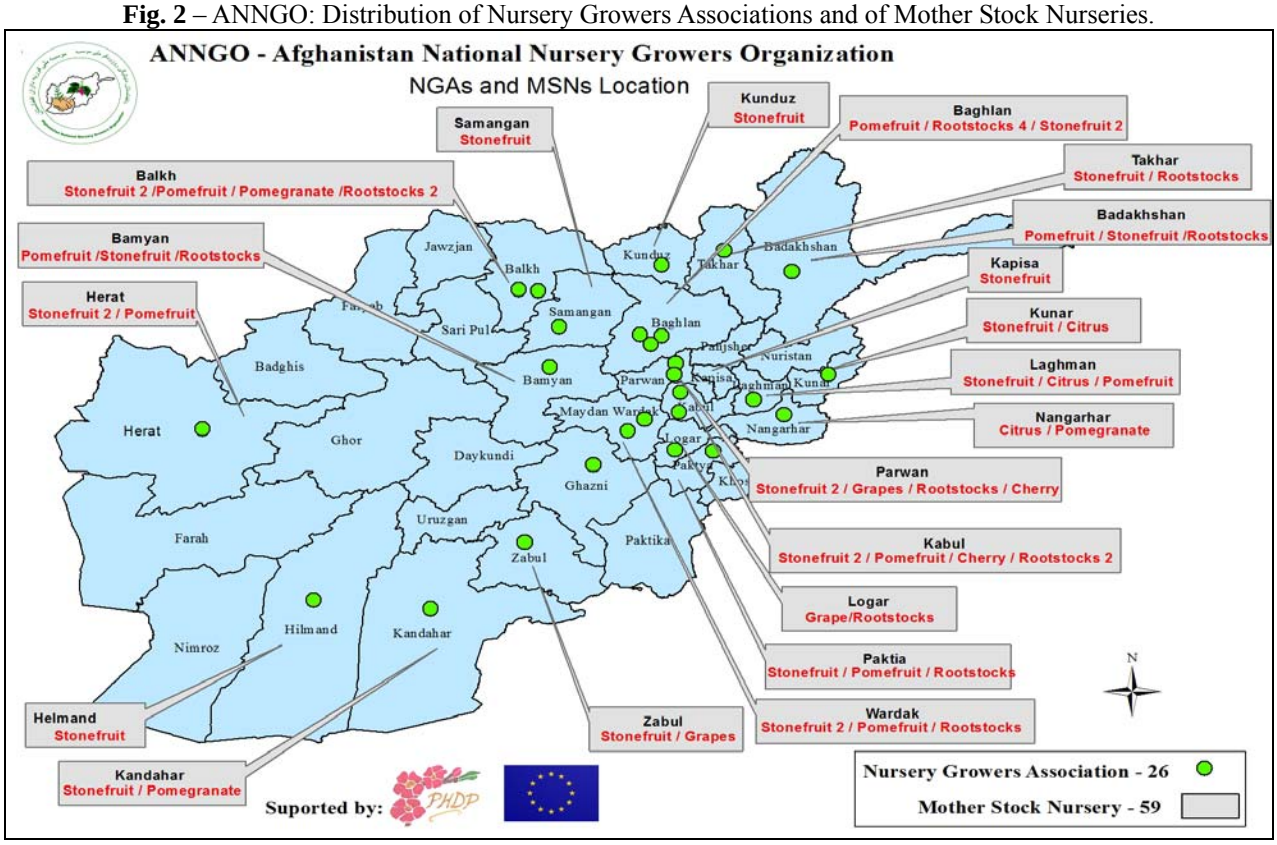
The other organization which is planned to give continuity to the activity done by PHDP I and II following the concept of sustainability, is the Afghanistan National Horticulture Development Organization (ANHDO), actually an NGO devoted to the development of a modern and sustainable horticulture in partnership with MAIL and private sector. ANHDO offer technical services for studies and surveys, training and capacity building, germplasm conservation, adaptive research, value chain studies, post-harvest technology and marketing. ANHDO is taking over the management of the National Collection and the 6 PHDP Centers in the MAIL research farms (which include also demonstration orchards, pomology laboratories and training rooms). ANDHO, with a grant from EC, is supporting the ongoing

transition of horticultural services from PHDP to MAIL.

Adaptive research

The facilities provided by PHDPs (pomology laboratories in each PHDP Center, demonstration orchards, capacity) allowed to plan and develop various adaptive research activities, considered basilar to the improvement of productivity and quality of fruit growing. In Table 3 the list of the adaptive research lines is reported. The results of some of these investigations are already applied, for instance in the design of almond and apricot orchards for the choice of inter-compatible varieties, since many of the Afghan varieties resulted self-sterile. This information is diffused also through the Catalogue released by ANNGO.

Fig. 2 – ANNGO: Distribution of Nursery Growers Associations and of Mother Stock Nurseries.



Tab. 3 - List of adaptive research lines launched by PHDPI and II and now being handed over to ANHDO.

1. Description and evaluation of varieties
2. Assessment of genetic potential and selection of national almond genotypes
3. Assessment of compatibility of national almond clones
4. Use of Afghan and imported germplasm to develop improved varieties of almond
5. Assessment of self-compatibility of national apricot clones
6. Use of Afghan and foreign clones to develop improved varieties of apricots
7. Assessment of self-compatibility of national plum clones, including crossing with Myrobalan
8. Fruit processing – sulphur drying of apricots
9. Monitoring of *Psilla pyri* on pear clones
10. Plant protection against pest
11. Soil management and quality of fruits
12. Grafting compatibility of pears clones

The adaptive research "Use of Afghan and imported germplasm to develop improved varieties of almond" is a clear and simple model of innovation applied to actual local resources. Most of local Afghan varieties of almond are very early flowering (a negative trait because of recurrent frost damage), paper shell (a good commercial characteristic in terms of kernel/shell ratio and de-shelling), typical in kernel shape (crescent type) and very appreciated for their taste. Indeed these are the most outstanding characteristics of the "Sattarbai" group, producing the most valued almonds in Afghanistan. The seeds resulted from the compatibility trials carried on with many local cultivars in 2008-2009 were planted and a first selection of F_1 seedlings was performed in 2012 by almond producers and retailers. The best F_1

seedlings will be re-checked and possibly released as new cultivars in near future. An improvement of this participative "breeding" activity is related to perform crosses between local (bringing high quality fruit traits) and international varieties characterized by late flowers, a trait which allows to escape spring frosts; from this set of seedlings it is expected to obtain new high quality, Afghan type and late flowering cultivars.

CONCLUSIVE CONSIDERATIONS

The pillars on which PHDP is founded cover a wide spectrum of activities, in accordance with the priorities acknowledged for the development of Afghan agriculture [10], related essentially the application of an innovative traceable propagation system to the local fruit germplasm, which is a relevant component of agrobiodiversity in Afghanistan. Fruit genetic resources are, furthermore, an actual and potential tool for the fair development of fruitculture, a strategic sector for this country. The selection and rational utilization of local varieties (both for direct fruit production and for breeding), their conservation and registration as national genetic resources, represents a way to protect this material from illegal appropriation and genetic erosion, but also a means to develop capacity building in both institutional and private sectors, and to promote indirect activities. Looking forward, some relevant items of the new scenarios of Afghan fruit industry to be addressed are quality standards for domestic and international markets, food safety regulations namely to export dried fruits and nuts, post-harvest management of soft fruits (being transport facilities and cold chain key factors), institutional support to these activities. Notwithstanding the goals achieved by the project, its further development will still need the support of international donors. Nevertheless a strong base for sustainability has been posed on local organizations; this represents an important step beyond total dependency.

ACKNOWLEDGEMENTS

As understandable, it is impossible to quote all the persons who directly or indirectly contributed to reach the results here described. During these years PHDPs had a normal turnover in both local and international people, to whom goes our appreciation for the collaboration and constant enthusiasm. We hope that each one of them, perhaps reading this paper, will feel the emotion of have been or being involved in something really special.

A special acknowledgement for the “distant” and silent work of the consultant agencies and other members of the partnership which never denied their help to solve sometimes almost “unsolvable” cases.

A particular appreciation is also due to the staff of the EC Delegation in Kabul, for trusting on this project, for its support and specially for giving the necessary continuity to it.

A special mention to the MAIL of Afghanistan the acceptance and the collaboration with the PHDP.

Last but not least, an almost inexpressible acknowledgement to all the collaborators from Afghanistan for their everyday patience, constructive obstinacy and permanent availability to join us; thanks to the Afghan farmers of the villages for having kept alive all the accessions collected by PHDP, jewels of the past and treasures for the future.

NOMENCLATURE

EC	European Commission
PHDP	Perennial Horticulture Development Project
MAIL	Ministry of Agriculture, Irrigation and Livestock - Afghanistan
NC	National Collection
ANNGO	Afghanistan National Nursery Growers Organization
ANDHO	Afghanistan National Horticulture Development Organization
NGA	Nursery Growers Associations
MSN	Mother Stock Nursery

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ANALYSIS OF THE SUSTAINABILITY OF SLOW FOOD MUSHUNU CHICKEN PRESIDIUM IN KENYA

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ABSTRACT

Rural development, the emergence of new alternative models of food production and consumption and their sustainability are today topics of great importance, which the world of Cooperation and Development reflect upon from different points of view. Within these issues, starting from the case study of the Slow Food mushunu chicken Presidium in Kenya, we present the results in terms of project's sustainability, carried out based on the SEAMETH methodology. The processing of data, coming from targeted interviews administered directly to the producers, is a useful tool for monitoring and evaluating the project, which provides a broader understanding of the Presidium, reconstructing a comprehensive framework able to measure the environmental, social and economic impact and implications.

INTRODUCTION

When we talk about Cooperation and Development, we cannot fail to talk about sustainability both as an end and as a means. In fact, sustainability has so far influenced the debate on Millennium Development Goals (MDGs) and, following the Rio +20 conference in 2012, this will become even more explicit and obvious through the decision to establish global targets not only for development but also for sustainable development (SDGs) [1]. It's also evident that coexistence can become a global goal, achievable only through an involvement based not on competition, but on a more widespread and shared cooperation for a coordinated management of the common resources of the planet, if we really want to understand sustainable development not just as compensation but in the terms of intra-generational equity and cooperation [2] [3].

The theme of sustainability also goes back to the technical management of Cooperation and Development projects, both as an end and as a means. The durability and reproducibility of the projects are some of the essential conditions that evaluate the results: equally, monitoring activity of variables and dimensions that make up the sustainability linked to the scopes of the project may contribute to the achievement of the objectives [4] [5]. However, monitoring the sustainability of a system is a long-term exercise in which qualitative indicators are also used not to exclude some essential characteristics of sustainability[1].

The SEAMETH methodology was born within this context, with the aim of providing a tool for the analysis and monitoring of projects whose aim is to achieve a multidimensional sustainability through the use of a grid of quantitative and qualitative indicators for the evaluation of the economic, agro- environmental and socio-cultural results [6]. In particular, this method has four potential uses [7]:

- assessing the sustainability of a project at time T (usually T0 is the start date of a project and T1 is the time of data collection);
- monitoring the progress, in terms of sustainability, during the development of a project;
- offering (to the beneficiaries and reference people of a project) a tool to better understand the logical framework of a project and evaluating the sustainability of single activities that contribute to achieving the final objectives;
- promoting dialogue and exchanges not only internal, but also within the institutional context external to the project.

CONTEXT ANALYSIS AND METHODOLOGY

The SEAMETH methodology, consisting of a grid of 51 indicators grouped by components related to three scales of social, environmental and economic sustainability (*Table 1*) [6] was applied to Slow Food mushunu chicken

[1] Technically, qualitative indicators may be imperfect, but the success of the evaluation lies not only in the indicators themselves, but also in the process of designing them and in the discussions among the various parties involved in their verification and necessary adjustments.

Presidium in Kenya as part of Fiorito bachelor thesis dissertation [8] that took into account the three Slow Food Presidia located in Molo and Njoro districts.[2]

The Slow Food association was founded in Italy in 1989 to promote the culture of food and to defense traditional food production and agriculture. Among the many activities carried out by Slow Food that engage local communities, the Presidia are fundamental: these are projects aimed at supporting small local production, breeds or plant varieties in danger of disappearing, protecting territories and recovering ancient traditions and techniques [9].

Tab. 1 - Sustainability evaluation: scales and components.

Socio-cultural scale	Agro-environmental scale	Economic scale
Use of the product	Biodiversity	Development
Internal relations	Territory	Efficiency
External relations	Animal breeding	
History, culture and tie to the territory	Energy	

The Slow Food Presidia are *"chains of animal or plants derived products from virtuous agricultural systems and small - scale breeding"* [6] in which sustainability, in all its three dimensions, is a fundamental objective. The research has therefore sought to reconstruct the production chain of Slow Food mushunu chicken Presidium with the aim of evaluating and monitoring the project. The data collection was carried out through administration of a questionnaire to a sample of ten producers, about one-third of the total members of the group: the interviews conducted were elaborated using the grid of sustainability indicators in order to define an overall assessment of the Presidium in terms of sustainability.

THE MUSHUNU CHICKEN PRESIDIUM

The Slow Food movement in Kenya is one of the most active in Africa. The activities in the country started in 2004 after the first edition of Terra Madre and over the years they have significantly developed in terms of projects implemented and number of members: currently there are five Slow Food Presidia and a network of approximately 200 family, school and community gardens. Among the five Presidia active in Kenya, the mushunu chicken Presidium, found in Molo in the South West Kenya, was established in 2009 to protect an endangered native breed, characterized by featherless neck, heavy body and a plumage that range from yellow to black and white.

The Presidium, which today counts a total of 32 producers that unite in Kihoto Self Help Group, was created to protect and promote this breed, unpopular to the local population due to threats posed by introduction of non-native breeds characterized by faster growth and greater resistance. The Presidium therefore aims at helping the group preserve, improve and enhance the breeding challenged by a number of factors, including the post-election violence that erupted in Kenya between 2007-2008 during which producers lost much of their animals.

RESULTS

In figure 1, it is possible to observe an overview of the results of the three scales of sustainability.

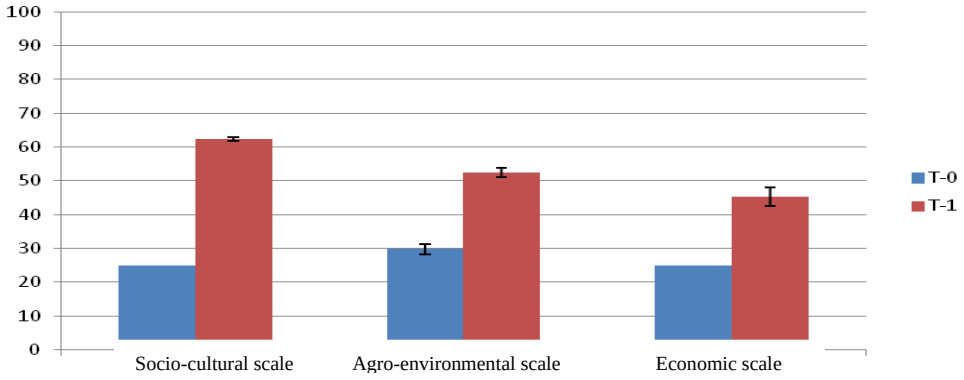

Fig. 1 - T0-T1 comparison of the three scales with weight 100. The maximum value of sustainability is 300

[2] The thesis aims at studying and analyzing three Slow Food Presidia of mushunu chicken, Lare pumpkin and Mau Forest dried nettles.

In general it is possible to observe a positive evolution of sustainability in all the three scales considered: a significant growth can mainly be noted on the socio-cultural scale (from 24.92 to 62.30), but also on the agro-environmental (from 29.79 to 52.4) and the economic scales (25 to 45.2.) However, it's necessary to conduct a more thorough analysis to understand how and where these results originated, giving more details of the sustainability scales taken into account.

Socio-cultural scale

As already noted, it is precisely in the socio-cultural context that the best results and most innovative elements can be observed with a positive evolution of sustainability for all the components considered (*Fig. 1*).

A positive growth of values has been observed in respect to the following components "History, culture, ties to the territory" and the one called "External relations". Thanks to the establishment of the Presidium and to the support from Slow Food, important progress has been observed in the relationship between the group and some external public and private institutions, local NGOs, the Ministry of Agriculture and various private entities. The relationship with the Slow Food network has also clearly improved both nationally and internationally. Within the network of Terra Madre food communities, the Presidium has been able to benefit significantly from exchanges with the Italian Valdarno chicken producers, a Slow Food Ark of Taste product: it has been an interesting exchange program and an important opportunity to develop some shared knowledge within the network of Terra Madre food communities, which has allowed an interaction between these two realities through exchange visits. These social aspects demonstrate the power of Slow Food network and the social and territorial cohesion, which characterizes and unites the Terra Madre food communities that operate in many different contexts around the world.

Still, on socio-cultural field, mushunu chicken Presidium has also helped in raising the producers awareness on the existing link between the product and the area, and about the cultural and traditional value that characterizes food. Finally more modest improvements were observed under the component "Product use", in consideration of the fact that although the organoleptic quality is generally improved, it has not yet been possible to work in the direction of implementing new conservation and processing techniques.

Agro-environmental scale

From the environmental point of view, although a general and positive evolution of values has been observed over time, these are less obvious improvements compared to the socio-cultural scale, due to the fact that the Presidium was already characterized by good performances in this field in the phase of boot design. Furthermore, the agro-environmental scale is generally the one that makes the growth record slower with changes observable over a longer span of time than the one, equal to only 3 years, taken into account in this research.

The Presidium has guaranteed an important contribution to the defense of biodiversity through the work carried out in the protection of a native breed and in order to prevent the introduction of non-local chicken hybrids: today in Kenya non-local chicken varieties are in fact getting popular because they are more resistant and characterized by a faster growth than the native breeds whose diffusion and breeding is therefore put at great risk.

Even compared to the territory, the contribution of the Presidium to the preservation of traditional cultivation practices as well as the environmental balance is really important

Under the heading of "Animal breeding" component, it was, however, observed that even before the establishment of the Presidium the producers reproduced the animals at family - home level and the chicken were free-ranged in open and wide spaces. The supplied feeds are based on foods that come almost entirely from local agricultural production. Yet in the field of "Energy", much remains to be done in order to introduce the producers to the use of renewable energy sources: it is necessary to note that the villages in which the Presidium producers live are not supplied with electricity and in general energy consumption is very low if not nonexistent.

Economic scale

The positive evolution of sustainability in the economic context is mainly attributable to the growth that has affected the "Development" component. In fact, following the birth of the Presidium, the number of birds per family/household has increased as well as spaces dedicated to them. Today the average number of birds per producer is about 10 (which varies considerably during the year).

The reduced growth of the "Efficiency" is instead brought about by a very poor market development. Since the establishment of the Presidium, it had not been possible to create new commercial channels: the product marketing still remains at a loco-regional level. The production is quantitatively still too low and a number of pitfalls and difficulties have affected the producers, e.g. adverse weather conditions and diseases: these are some of the reasons behind the failure of the Presidium. The use of incubators recently purchased by Slow Food Presidium is an opportunity for the future, capable of increasing production to reach the target market.

The aim of Slow Food is to help in the development of this product in terms of commercialization, promotion of food sovereignty and economic livelihood improvement.

CONCLUSIONS

The analysis method used in this work has made it possible to come up with a wide and varied understanding of the Presidium, reconstructing a complete picture able to measure the impact and implications of this project in terms of sustainability.

Looking at the graph on Figure 2, where a T0 - T-1 comparison of various components that belong to sustainability scales taken into account is presented, it is possible to make some general considerations in respect to the prospects that the future development of the Presidium is likely to face.

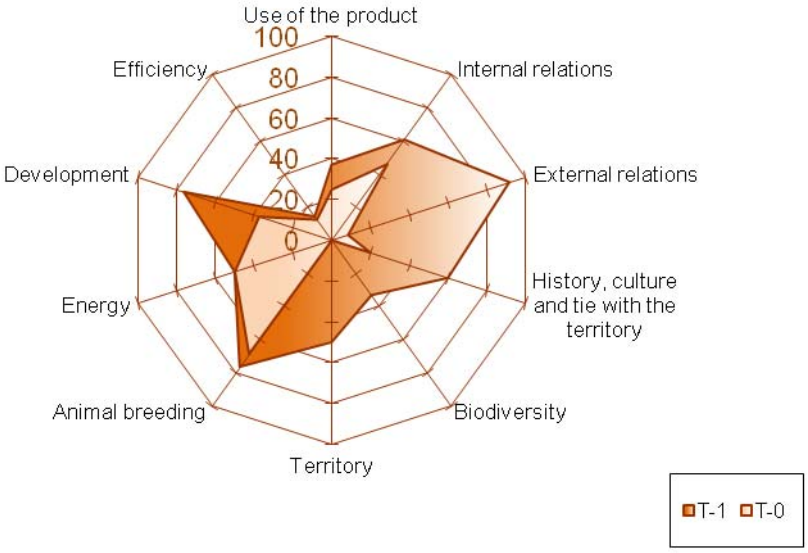

Fig. 2 - T-0 – T-1 comparison of various components that belong to the sustainability scales taken into account.

Compared to the first component "Product use", characterized by a very low increase of values at time T-1, it is possible to understand how important is to introduce new conservation and transformation techniques in order to expand the product use. Yet in the field of the "Biodiversity" and "Territory" which, although characterized by good growth between time T- 0 and T -1, still stood on low values, it is necessary to further promote the conservation of the rural landscape of which the Presidium is part of and to promote productive diversification. Still in the field of agro-environment scale, the need to introduce the use of renewable energy sources in the near future to promote the development of the Presidium and the general community involved has been highlighted. Finally, as part of the economic scale, looking at the poor growth of "Efficiency" it is possible to understand the need to support the future marketing goal of the product in order to promote the development of the project and the economic wellbeing of producers involved.

Taking into account the different dimensions of sustainability and their variation in this specific case of the mushunu chicken Presidium, the grid of indicators developed through practical application experience, now and in the future allows a feasibility study project and a study for monitoring the progress of planned actions to be implemented in the future: it may trigger a virtuous activity of data production, as well as a model for sustainability reporting.

In particular, the developed method has proven effective as a tool for:

- assessing the sustainability of the Presidium at time T (in this case T0 is 2009, the year in which the Presidium was established, and T1 is September 2012, the time of data collection);
- monitoring progress in terms of sustainability, during the development of the project;
- offering a tool that helps the producers and Presidium coordinators to better understand the concept of agriculture, especially sustainable farming, and evaluating the sustainability of their production in timely manner;
- promoting not only internal dialogue (between the Presidium producers), but also exchanges with external parties, on the concept of sustainable agriculture and the contribution that the Presidium can offer to this area.

In conclusion, in relation to the study and analysis carried out on Slow Food mushunu chicken Presidium, it was possible to observe good knowledge and territorial links that in this context characterizes the Slow Food network: in fact, an enhanced awareness was indeed found among the producers about the importance of local and traditional products like mushunu chickenas as well as a renewed pride and a renewed push to their production and consumption.

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THE ROLE OF DIVERSITY AND DIVERSIFICATION FOR RESILIENT AGRICULTURAL SYSTEMS

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ABSTRACT

Biodiversity is a unique and precious heritage: generic but also cultural, social and economic. Its drastic curtailment, however, puts at risk the survival of local farming systems, and this is even more so in fragile socio-economic contexts where it risks translating into conditions of food insecurity and poverty. From the elementary level of the gene, rising in complexity up to the ecosystem, it is therefore a central element in defining first the resistance and then the resilience of the system, and by the first term meaning the degree of resistance to a disruption that distances it from the initial state of equilibrium and by the second the capacity of a system to return to guaranteeing minimum standards following a disturbance, the capacity to get back on ones feet after a fall.
It seems to be crucial, then, at a time when cooperation development projects that operate in various ways to safeguard and promote biodiversity are far more numerous, to intervene to preserve and restore the local biodiversity in order to avert future problems, and even curb them ahead of time, using resilience as an approach for managing the system we are dealing with (natural or heavily affected by human activity). In any event, this is a passage that is not routine, which makes it necessary to look at the ecosystem, at its various components, both natural and human. In the light of these preliminary remarks, the article will analyse the potentiality for applying, also in the field of development cooperation, the theoretical approach including empirical methods and instruments represented by the Diversified Farming Systems DFS), where the starting point is diversity and diversification as functional elements in the construction of resilient farming systems.

INTRODUCTION

Biodiversity is central to defining a system's state of health. An ecosystem with species depletion, characterised by few individual species belonging to the most resilient groups, is more vulnerable and more subject to risks like desertification, colonisation by exotic species, an interruption in the supply of fundamental natural services, and food uncertainty, with serious consequences and repercussions especially in fragile socio-economic contexts. The management of the stresses is controlled by complex genetic systems, which involve the interaction of large gene systems and the connection of the plant/animal and its environment.

Biodiversity (from the gene, at the elementary level, increasing in complexity to the ecosystem) is therefore a key element in defining first the resistance and then the resilience of the system; by the first term we mean the degree of resistance to a disruption that distances it from its initial state of equilibrium, and by the second term the capacity of a system to return to guaranteeing minimum standards following a disturbance, the capacity to get back on ones feet after a fall.

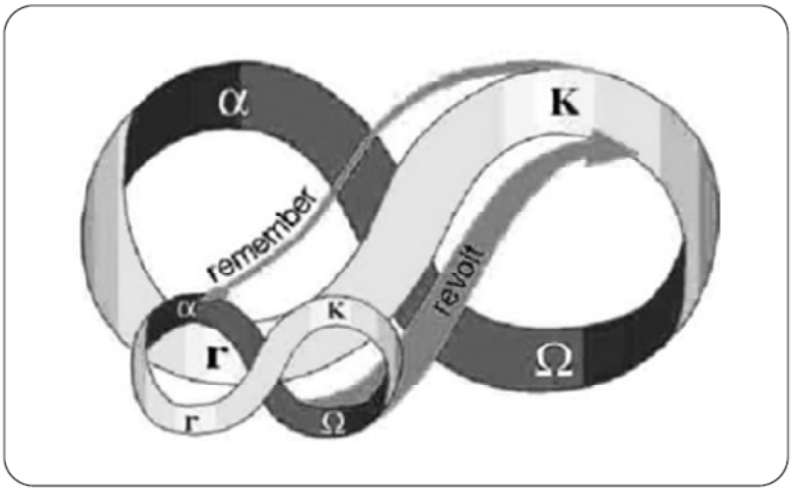
In the face of harvests lost because of the Brusone disease of rice, farmers in the Chinese province of Yunnah, who have adopted a farming system using different varieties of rice, registered an increase in production of up to 89 per cent. At the same time these farmers have conserved the traditional genetic diversity of the local varieties and reduced the use of fungicides [1] [2]. Also in Italy we have seen that a high level of genetic diversity provides greater protection against drought for wheat harvests [3].

It would seem crucial, then, to work to preserve or restore the local biodiversity to avoid problems in the future, and actually stem them ahead of time, using that same resilience to construct models/projects that allow us to successfully overcome future crises. In this sense, more than an objective, resilience is an approach for managing the system we are dealing with (natural or affected by human activity). Sensitivity regarding these issues is slowly growing; not surprisingly, the recent report of the High Level Panel on Global Sustainability, advocated by the Secretary General of the United Nations, Ban-Ki-Moon, in its title and contents takes up the concept of resilience: *Resilient People, Resilient Planet: A future worth choosing* [4].

This means using biodiversity and the richness of ecology to decide how to prevent hydrogeological instability, to manage the consequences of a catastrophic event like an earthquake or a pollutant spillage, how to manage a low impact disinfestation campaign on parasites, how to use local resources to stem an economic crisis, without disturbing

the general dynamic state, composed of various levels of equilibrium that are interspersed with adaptive cycles, within a perennial transient state. According to this thesis developed by C.S. Holling [5], populations and, by inference, ecosystems have more than one state of equilibrium, and following a disturbance often a different equilibrium to the previous one is restored and they depend on the influences of the states and dynamics that occur at the levels above and below the system itself [6] (*Fig.1*).

Fig. 1 - Relations between several phases and adaptive cycles [7].



In numerous development cooperation projects aimed at the conservation and sustainable use of the ecosystems and habitats containing a high degree of diversity, as well as the preservation of genome types and genes of social, scientific or economic importance and the fair division of the benefits deriving from the use of genetic resources, a genuine protection and valorisation of biological diversity can occur exclusively through inter-sectorial action, which looks at the ecosystem in all its diverse components, both natural and human.

For cooperation projects in the agronomic context, a particularly interesting approach in this direction is the theoretical framework of the Diversified Farming Systems (DFS), recently drawn up by a group of researchers at the University of Berkeley in California. These are models that agree upon the attention to local production, to farmers' knowledge and practices, to approaches capable of limiting the negative environmental externalities, whose goal is the improvement of the sustainability and resilience of farming systems, and thereby making a significant contribution to fundamental issues like food security and health [8].

BIODIVERSITY AS A STARTING POINT

The DFS model is innovative in that it goes further and reconstitutes in an original way the now abused concepts of sustainable, multi-functional and biological agriculture, in an attempt to create a common denominator through meeting minimum objectives from among the various approaches that seek to achieve farming that is capable of providing sufficient food and maintaining the ecosystem services for present and future generations, in an era of climate change, increasing energy costs, social unease, financial instability and growing environmental degradation. All this also in light of the diversity of the ecological, socio-economic, historic and political contexts in which farming systems developed and are still evolving.

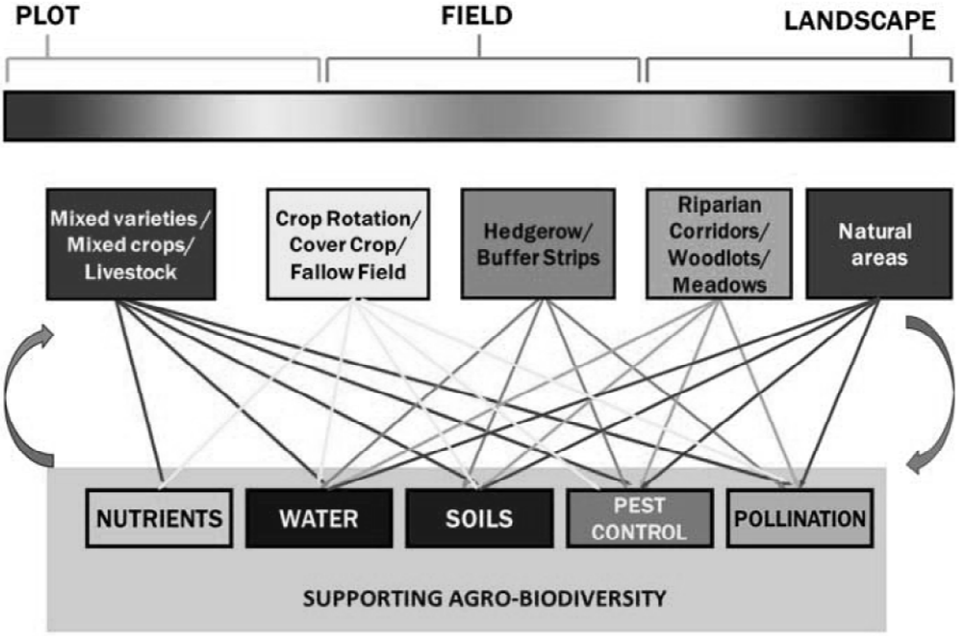
So, rather than starting with a vision from which a pre-defined model follows, the approach is that of operating on a series of attributes, which necessarily should possess a system that you want to define as sustainable for working on a strategy of farming production capable of inverting the negative externalities produced by erroneous farming technologies and about which an article published in the International Journal of Agricultural Sustainability [9] sought to draw some attention to, where the following main characteristics were identified:

- the employment of local varieties and breeds, so as to bring out the **genetic diversity** and improve adaptation to changing biotic and environmental conditions;
- avoid the unnecessary use of agrochemistry and other technologies that have a negative impact on the environment and on human health (like heavy machinery, transgenic farming, etc.);
- the efficient use of resources (nutrients, water, energy, etc.), the reduced use of non-renewable energy to limit dependence on production factors outside the company;
- the valorisation of agro-ecological principles and processes, like the cycle of nutrients, nitrogen fixation, biological control using the promotion of diversified farming production systems, and the agroecosystemic optimisation of **functional biodiversity**;

- innovation through recourse to human capital in the form of scientific knowledge and traditional and modern skills, and the promotion of appropriate innovation and technology networks thanks to the use of social capital and respect for cultural identity;
- the reduction of the ecological footprint of the production, distribution and consumption system, so as to reduce greenhouse gas emissions and keep pollution of the ground and water to a minimum;
- the promotion of practices that can increase the availability of drinking water, carbon sequestration, **the preservation of biodiversity**, soil and water;
- the capacity to adapt to change based on the possibility to respond quickly to disturbances, pursuing a balance between the capacity to adapt in the long term and short term efficiency;
- reinforcing the resilience of the farming system **by preserving the diversity of the agroecosystem**;
- the dynamic preservation of the socio-cultural legacy of the farming heritage, permitting social cohesion and a sense of pride and belonging, reducing migration.

These attributes often focus attention on biodiversity (highlighted in bold) as a crucial ingredient of the resilience of the agroecosystem. The approach of the DFS is positioned within these assumptions and identifies in diversity the starting point, including it intentionally and functionally in the various spatial (from field to landscape) and temporal scales of reference [8]. In this way, maintaining and preserving diversity assumes the function of a flywheel for maintenance and balance (intended in the dynamic sense) of the services of the input ecosystem of farming (soil fertility, control of pathogens, pollination, the efficient use of water resources).

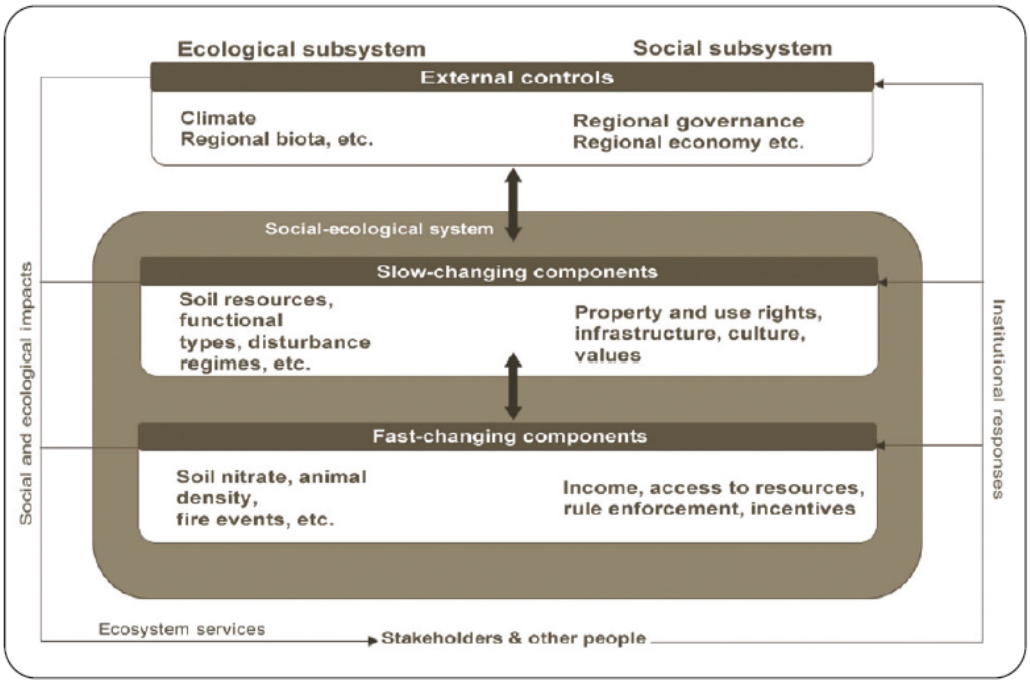
Fig. 2 - Conceptual model of a diversified farming model [8].



In this way, biodiversity is located within a strategy characterised by resilience as an approach and not as a mere end, the first functional unit of a complex system, where the role of the social component should not be undervalued. Recognising, according to one's view of human ecology [10], that ecosystems are heavily interconnected with the social fabric in which they exist, and that this is particularly so for farming as the result of the perennial connection between human societies and ecosystems, the result of a co-evolution between nature and culture (*Fig, 3*), particular importance is given to aspects like:

- the interdependence between social, economic and ecological systems;
- the social factors and processes that influence and maintain the processes of an economic nature;
- the social structures, values and hierarchies assigned to some identity markers like ethnic background, class and gender;
- the decision-making processes, the construction of alliances and governance.

Fig. 3 - Conceptual model of integration between ecological / social components in the ambit of a farming system [11].



THE POTENTIALITIES OF THE DFS APPROACH FOR DEVELOPMENT COOPERATION

Research in the field of the sustainability, the resilience, and the vulnerability of socio-ecological systems is becoming ever more important and is significant also for the political and economic sphere, and it is our hope that they can contaminate in a positive sense the world of development cooperation (research and practice). In this sense, we feel that the DFS approach has some potentialities and some points to reflect upon regarding the objectives of development cooperation. Once again, not as much as biological diversity, in that it is the object of cooperation projects and interventions, but the way in which we work on diversity, through an approach to resilience, to attain development objectives that necessarily have to take into consideration the reference socio-territorial context, in terms of institutional analysis.

In fact, knowledge of social institutions is crucial, namely the combination of regulations that human beings use to organise interactions of a repetitive and structured nature, including those within the family, the neighbourhood, in the market, in the factory, in church, of organisations and government at all levels [12] to understand how to deal with biodiversity so that it can generate a resilient system. This is the result of collective, long-term action, where the benefits and the positive externalities associated with the maintenance of the agro-biodiversity are evident to all.

It seems to be especially important how to integrate scientific knowledge and traditional and modern skills, and to promote innovation and technology networks suitable for the use of social capital and for respect for cultural identity within a process that includes diverse stakeholders including farmers, engineers, researchers, local governance, where the cooperation projects should stand as facilitators, where traditional knowledge can integrate with that deriving from scientific and technological innovation.

We can observe, then, in the DFS theoretical model a series of ideas that should be examined more closely through training and occasions for discussion in an academic context, through a necessarily interdisciplinary perspective and with operators of the cooperation sphere, especially regarding the potentiality of the DFS approach as a process for education, training and technology transfer that can better take into account the complexity and the diversity of the systems, in a context like that of cooperation projects, where cultural diversity is a fact, and which could, however, be a further value added.

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