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Studies, plans,  
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**Intangible cultural heritage, territorial valorisation and local communities.  
Focus on dry stone walling and Mediterranean diet**

*di Antonio BERTINI, Candida CUTURI*

*Abstract*

The “Art of dry stone walling, knowledge and techniques”, inscribed on the Representative List of the Intangible Cultural Heritage of Humanity and concerning eight European countries, exemplifies a harmonious and symbiotic relationship between human beings and nature. Considered as one of the oldest ecological techniques and used both for housing and agriculture, dry stone walling plays a crucial role in the hydro-geological protection of steep slopes. The low-impact technique of dry stone walling, shaping Mediterranean landscapes across millennia, goes well with the Mediterranean diet, another transnational asset within the UNESCO List of Intangible Cultural Heritage. The Mediterranean diet involves a set of traditions, know-how, skills and practices, from the landscape to the table, concerning cultivation, harvesting, fishing, conserva-



*Amalfi coast landscape  
(Cuturi C., June 2019).*

tion, processing, cooking and consumption of food. Diet involves economic, social and cultural implications, related to local food products, seasonal rhythms, identity and diversity, sharing of food and values. Dietary behaviours and landscapes are strictly interrelated, in terms of consumption of resources, choice of agricultural cultivations and breeding animals. The recovery of the relations and balances between human beings and the environment, built-up areas and the territory, genius loci and identity, is one of the main objectives to be pursued. The paper highlights the sustainable building of the terraced landscape as an ecological approach related to the protection and valorisation of the territory and the Mediterranean diet (a good practice for local development).

**KEYWORDS:**

*Intangible Cultural Heritage; Terraced landscape; Dry stone walling; Amalfi coast; Mediterranean diet*

**Patrimonio culturale intangibile, valorizzazione territoriale e comunità locali. Focus su muratura a secco e dieta mediterranea**

L'arte, la conoscenza e le tecniche della muratura a secco, nella Lista del Patrimonio Culturale Intangibile dell'Umanità, esemplificano il rapporto armonioso e simbiotico tra esseri umani e natura. Considerata tra le più antiche tecniche ecologiche ed utilizzata sia in edilizia che in agricoltura, la muratura a secco riveste un ruolo cruciale nella protezione idrogeologica di versanti ripidi. A basso impatto ambientale, ha forgiato i paesaggi mediterranei nel corso di millenni e si sposa bene con la dieta mediterranea, un altro bene transnazionale inserito nella Lista UNESCO del Patrimonio Culturale Intangibile. La dieta mediterranea implica una serie di tradizioni, saperi, abilità e pratiche, dal paesaggio alla tavola, in relazione a coltivazione, raccolta, pesca, conservazione, preparazione e consumo di cibo. La dieta comporta implicazioni di tipo economico, sociale e culturale, in merito a prodotti locali, ritmi stagionali, identità e diversità, condivisione di cibo e valori. I comportamenti alimentari e i paesaggi sono strettamente correlati, in termini di consumo delle risorse, scelta delle colture agricole e degli animali da allevamento. La riscoperta di relazioni ed equilibri tra esseri umani ed ambiente, aree costruite e territorio, genius loci e identità, rappresenta uno dei principali obiettivi da perseguire. Il paper evidenzia la costruzione sostenibile del paesaggio terrazzato in quanto approccio ecologico connesso alla protezione e valorizzazione del territorio e della dieta mediterranea, quale buona pratica di sviluppo locale.

**KEYWORDS:**

*Patrimonio Culturale Intangibile; Paesaggio terrazzato; Muratura a secco; Costiera Amalfitana; Dieta mediterranea*

## Intangible cultural heritage, territorial valorisation and local communities. Focus on dry stone walling and Mediterranean diet

*Antonio Bertini, Candida Cuturi*

### 1. Introduction<sup>1</sup>

The conservation and valorisation of diverse landscapes and protected areas, resorting also to naturalistic engineering interventions, dry stone walling and Mediterranean diet, are key objectives which programming, planning and implementation of interventions should hold in due consideration, in order to reverse the last century trend deeply impacting on natural processes and accelerating climate changes.

The art, knowledge and techniques of dry stone walling and the Mediterranean diet are both transnational elements within the UNESCO Representative List of the Intangible Cultural Heritage.

The recent acknowledgment of the art of dry stone walling as intangible cultural heritage represents a further step towards a more sustainable development, with particular reference to the valorisation of agricultural and suburban territories.

Dry stone walling has played an important historic role in Italy, since it was used not only by Messapians and men of nuraghes but also by most people living on the hills and mountains of Apennines, along the Italic peninsula from Liguria to Calabria. Walls and perimeter fences of several pre-roman centres were realized through the dry stone walling technique, using also stones of huge dimension, still partly preserved.

Throughout the Mediterranean basin, dry stone walling has contributed to shaping landscapes across millennia, through different ways of building houses and organizing farming and breeding livestock. The technique has always promoted convenient micro-climate conditions for agriculture and enhanced biodiversity. Besides dry stone walling plays a vital role for the territory, preventing landslides, avalanches and flooding, and combating soil erosion and desertification.

Particularly in the past, the agricultural landscape could give information about the food behaviour of a population, as well as its economic activities. Dietary behaviours would depend on territorial features, while impacting on landscape at the same time. The relationship between diet and landscape allows the comprehension of cultural, social and territorial systems.

Some Italian small-sized centres, not renowned, are still characterized by Mediterranean lifestyle and diet which are not based on abundance and waste: Mediterranean landscapes are built on shortage, limits and measure. Vazquez Montalbàn wrote that the Mediterranean Sea is the place where women and men eat oil, olives and aubergine-

nes, key food of every Mediterranean culture (Cavallo, 2016).

## 2. Dry stone walling

### 2.1. *The art of dry stone walling, knowledge and techniques*

In November 2018 the “Art of dry stone walling, knowledge and techniques” - concerning Croatia, Cyprus, France, Greece, Italy, Slovenia, Spain and Switzerland - was inscribed on the Representative List of the Intangible Cultural Heritage of Humanity<sup>2</sup> (UNESCO, 2018).

In Italy, it is the second time that the UNESCO recognition is attributed to an agricultural and rural practice, after the traditional practice of cultivating the “vite ad alberello” (head-trained bush vines) of the community of Pantelleria<sup>3</sup>.

Over millennia, in the Far East, South America, Northern Europe (Denmark, Ireland, Great Britain) and the whole Mediterranean basin, particularly in the northern area<sup>4</sup>, several and diverse landscapes have been shaped through the technique of dry stone walling, used in different ways in order to build houses and shelters and to manage more effectively farming and breeding.

Practised since the prehistory, the art of dry stone walling is to be considered as one of the oldest ecological techniques, since stone constructions are made by stacking stones upon each other without using any other material, except sometime dry soil (<https://ich.unesco.org/>).

These structures are deeply rooted in the lives of the rural communities, optimizing local natural and human resources. They are made in symbiosis with the environment and exemplify a harmonious relationship between human beings and nature.

The practice has passed down mainly through the practical application adapted to the particular conditions of the place. It is one of the first examples of human manufacture, particularly used for terracing. The cultivation of vineyards, olive groves and citrus orchards within steep territories has often been allowed by the expert use of dry stone walling.

The reduction of hydrogeological risk is one of the most important ecosystem services that a terraced landscape can provide. Particularly in Mediterranean areas, terracing system can strongly modify runoff processes on steep slopes, erosion and infiltration (Agnolletti et al., 2019).

The building of a dry stone wall outlining a field often involves the removing of stones, which is useful to the agricultural use. Dry stone walling improves biodiversity and fosters the best microclimate conditions for agriculture.

Dry stone walling allows ecological and landscape diversification. Rich flora and fauna survive within the dry stone habitat. Despite the hard and rugged surface, stone walls are a refuge for a wide range of plants and animals. Rain quickly drains off dry stone walls, creating dry conditions on the sunny side, while the shady side and the base re-

tain moisture, supporting local flora and fauna (<https://www.conservationhandbooks.com/>). During hot periods, humidity condenses in the stone interstices, making the walls damp also in the middle of summer. In the light of the peculiar microclimate, many animals take shelter among the stones; in Southern Italy and the isles, lizards, snakes, geckos, amphibians and several invertebrates are used to stay within dry stone walls, surviving also in the absence of the Mediterranean scrub. Also the moss, the lichen and other plants can grow within this favourable habitat. In ancient times, Italian women profited by the vegetable biodiversity offered by dry stone walling, picking rue, mallow, mint, as well as the “plant of small lights” (*Ballota pseudodictamnus*), whose flowers were used for oil-lamps and “erva spaccapetre” (*Phyllanthus niruri* or *Asplenium ceterach*)<sup>5</sup>.

In various European regions traditional agricultural practices have been disregarded, with unavoidable consequences of erosion and environmental degradation (Tosco, 2009). Within some Italian contexts, abandoned terraces are becoming a serious hazard, considering their uphill proximity to human settlements (Agnoletti et al., 2019). Therefore several activities are rising for increasing awareness on the subject, in order to recovery and preserve traditional techniques and cultural landscapes.

Naturalistic engineering plays a crucial role in terms of knowledge and techniques related to interventions not having great environmental and ecological impacts on the territory, so that it may come side by side to more traditional farming practices<sup>6</sup>.

The art of dry stone walling was going to disappear, due to the mechanized agriculture and the lack of skilled labor, affecting not only tradition, cultural identity and landscape, but also ecological biodiversity and territorial stabilization. Therefore the promotion of knowledge and know-how, recovery and valorization related to dry stone walling is to be pursued briskly.

Besides, dry stone walls may have archaeological values. In particular, some fictile foundings have been made - such as lamp remains of the ancient Roman period, or capitals - within areas in Puglia, Sicily and Sardinia.

## *2.2 Dry stone walling in the Italian context*

In Italy dry stone walling spreads all over the territory, from Liguria and Tuscany to Calabria and Puglia, in the islands of Sicily and Sardinia, supporting terracing and property division, as well as pastures.

The traditional technique is spread in most Italian regions, both for housing and agriculture, particularly for terracing in very steep areas. We remind the territorial system of “Cinque Terre” - villages along the jagged coast of Liguria - and the Amalfi coast, renowned all over the world (see the following subsection). Dry stone walls can be found in Salento and Valle d’Itria (Puglia), in Pantelleria isle (Sicily), in Sardinia.

Some dry stone walls, found in Sardinia, Sicily and Puglia, date back to the Bronze period.

The art of dry stone walling shows specific peculiarities in relation to each geographic context.



In Liguria, dry stone walls are key integral elements of the agricultural terraces, protecting land on the slopes; along the sea coast, they act as defence of crops from atmospheric agents.

In Puglia, dry stone walls - dating back to the period of Messapians<sup>7</sup> - have a square block structure, ordered horizontally, built with the aim of delimiting both patrician estates and small agricultural properties (in the last case called *chisùra*) ([www.patrimoniopubblicoitalia.it](http://www.patrimoniopubblicoitalia.it)). We remind the *trulli* in Valle d'Itria and the *pajare* in Salento, as well as the megalithic walls of Altamura, using the same building technique, realized between VI and III centuries B.C., with a length of around 4 km and a width of 6 metres.

In Italy we recognize about fifty localities preserving traces of dry stone buildings, on top of the hills, as acropolis for people settled since the VII century B.C., particularly in Lazio region, but also in Campania and Puglia, Tuscany and Umbria<sup>8</sup>.

In the Sicilian areas of Pantelleria and Ragusa it is possible to see different dry stone structures, such as the famous “*chiuse*” around the carob tree, to graze the animals.

Last but not least, Sardinian dry stone walls are landscape elements deeply rooted into the culture and rural tradition throughout the regional territory. The Regional Landscape Plan promotes the protection of specific assets expressing the sense of belonging of local communities to Sardinian culture and landscape. Dry stone walls divided, and still divide, land plots and define the route network (*camminus* and *andalas*). The archaic techniques were also used for building the *nuraghi* and sheperd's huts (the characteristic *Pinnette*) (Regione Autonoma della Sardegna, 2017).

With reference to legislative measures for the protection of dry stone structures and sites, in Italy the National Register of the Historic Rural Landscape, according to the UNESCO-sCBD Florence Declaration (2014), recognizes the agronomic and historic-cultural value of dry stone terraces, and their role for the biodiversity of rural territories. Therefore specific references to the maintenance of pre-existing terraces are provided within the Ministerial Decree 30125/2009 (UNESCO-ICH, 2018).

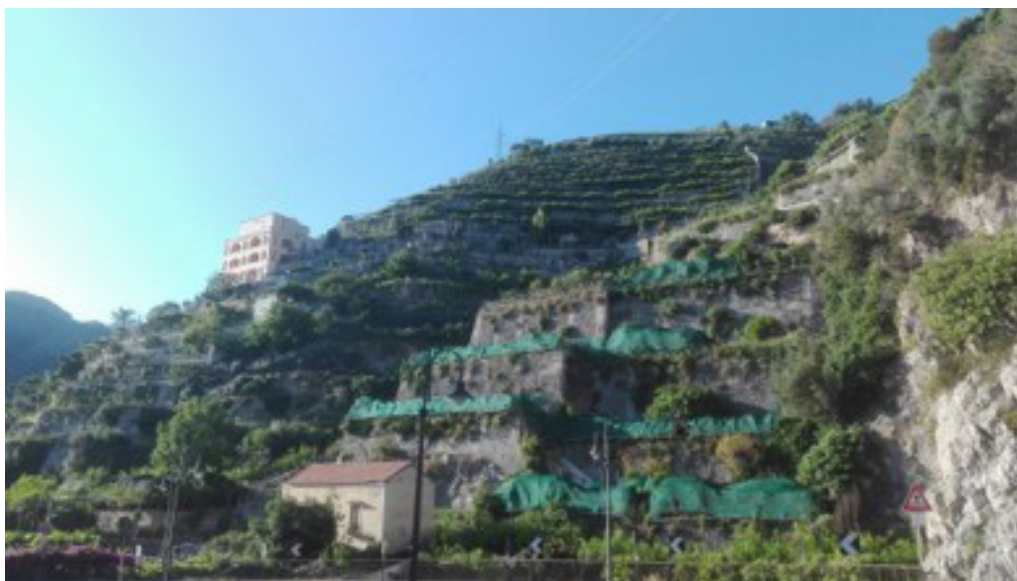
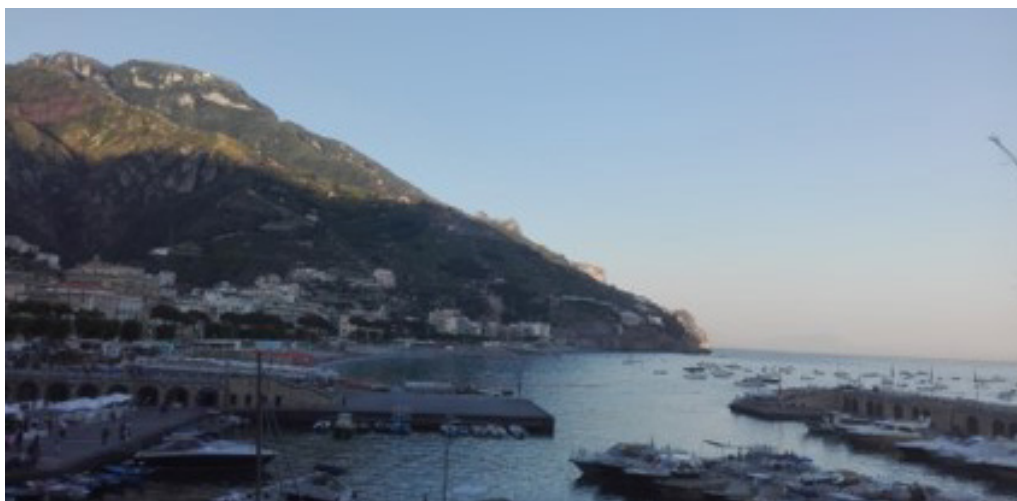
### *2.3 Dry stone walling along the Amalfi coast*

The Amalfi coast, on the southern shore of the Sorrentine Peninsula (Campania region), is an area of great natural/anthropic beauty and diversity, intensively settled by human communities since the early Middle Ages.

In 1997 the *Costiera Amalfitana* (Amalfi coast) was inscribed on the UNESCO World Heritage List as “an outstanding example of a Mediterranean landscape, with exceptional cultural and natural scenic values resulting from its dramatic topography and historical evolution” (<https://whc.unesco.org/en/list/830/>). The site (of outstanding universal value) was selected on the basis of three criteria, as an important interchange of human values (criterion ii), an outstanding example of building/landscape illustrating significant stages in human history (criterion iv) and outstanding example of a traditional human settlement/land use and human interaction with the environment (criterion v). The site property is around 11.230 hectares<sup>9</sup>.

The Amalfi coast, with its cultivated terraces, is a cultural landscape which expresses





*Fig. 1,2 - The Mediterranean landscape of the Amalfi coast (photos by Cuturi C., Minori/Maiori, June 2019).*

a lasting and intimate relationship between people and the natural environment, through the evolving and adaptable works of nature and humankind. It is considered as a part of our collective identity, testifying creative genius, respectful approach to the environment, traditional customs and social development (<https://whc.unesco.org/>).

The spatial organization of the settlements, on the slopes, is focused on the terraced system, acting also as a basement for houses, with roof-gardens above and stairs along the streams (Laureano, 2004).

The steep slopes rising from the coast are covered with terraces and dry stone walling, supporting the cultivation of citrus and other fruits, vines, olives and various vegetables (ICOMOS, 1997).

Dry stone walls (“macere”) and a tight structure of pergolas sustain the renowned cultivation of big and perfumed lemons (“sfusato amalfitano” variety), distinguished by its essential oils and antioxidant properties, and recognized as a pro-

ected geographical cultivation in 2001 (Limone Costa d’Amalfi IGP)<sup>10</sup>.

Citrus cultivation is a traditional activity within Amalfi territory. The export of citrus fruits abroad, also towards the United States of America, has been an important economic activity since the second half of the 19th century.

In the past a large number of people living in the area was involved in lemon-related activities, from dry stone walling and cultivation to production and marketing.

Nowadays the average age of the Amalfi’s lemon cultivators is about sixty and their retirement probably will not be replaced by the younger generation. Some mayors are seeking funding for ground sensors and remote-controlled cameras for monitoring the hills, as well as greater financial incentives for farmers, aimed at terraces maintaining and lemon cultivation<sup>11</sup>.

Amalfi terraced system allowed to use water coming from the top of the high ground and to canalize it through channels and ponds for collection. The terraces were con-

nected by a complex channel system used for irrigation, fed by streams and storage tanks.

The inhabitants adapted land uses to the peculiarities of the territory, ranging from terraced vineyards and orchards on the lower slopes to upland pastures (<https://whc.unesco.org/en/list/830/>).

Dry stone terraces constitute a self-regulating system, integrated within the environment, which needs to remain efficient, be recovered and valorized, in order both to preserve the historic cultural landscape and to safeguard the hydrogeological equilibrium and biodiversity of the slopes.

Recent studies suggest that the beneficial effects of terracing are more evident as more extensive and appropriate is the maintenance of surfaces. Abandoned and partially destroyed terraces - under trees and vegetation cover - can aggravate instability (Agnoletti et al., 2019).

The upper part of dry stone walls is inherently fragile, since more irregular and less resistant, therefore requiring regular maintenance, in order to manage degradation over time. Indeed the wall basement guarantees appropriate drainage conditions, by concentration of large stone material, and a terrace channel along the basement (outer wall) can help lateral runoff in case of intensive rainfall<sup>12</sup>.

Some modelling approaches/systems have been developed to describe hydrological processes on terraced slopes and to analyze the destabilizing pressures acting on retaining dry-stone walls, following monitoring campaigns on water circulation<sup>13</sup>.

As to some European dry stone walling landscapes, small scale integrated systems of springs, channels, water tanks for irrigation and mills are promoted, expressing a strong interrelationship between walling structures and land use (Bragança dos Santos, 2018).

In the last decade many landslides occurred along the Amalfi coast (involving also terraces), triggered by deep fractures in the rocky mass and by heavy rainfall. Landslides are affected by soil erosion (including slope and vegetation cover), fires and rainfall; they affect and are affected by terrace stability. Vegetation types affect both soil condition and fires, and vice versa (Savo et al., 2013). Besides environmental factors, the terrace system balance depends also by interrelating socio-economic aspects, impacting on the willingness to cultivate, such as market demand, production costs and market price, law restrictions, etc.

Unfortunately, the loss of agricultural vocation and manual ability has contributed to a progressive state of neglect of terracing, sometime left abandoned.

In the light of the challenges related to climate change, the integrated conservation and sustainable development of these fragile and peculiar territories are needed.

An increasing awareness of the importance of agricultural revitalization and rural landscape regeneration is spreading, as well as the promotion of agricultural activities and craftsmanship.

Terraced landscapes have given rise to specific interest and concern over the last years, on the background of a growing awareness of their cultural-historical, economic, environmental and ecological importance, with particular reference to their hydrogeological

functions within farm areas (erosion control, slope stabilization, reduction of surface runoff, etc.). Besides being considered as Cultural Landscapes by UNESCO, agricultural terraced landscapes represent the key focus of the Globally Important Agricultural Heritage Systems Program by the Food and Agricultural Organization of the United Nations (Agnoletti et al., 2019).

The UNESCO Management Plan related to Costiera Amalfitana has been a challenging occasion for the territory, considering the governance issues related to the presence of different institutions, having specific tasks and responsibilities<sup>14</sup>.

Nevertheless, the different peculiarities of towns and villages, when properly valorized, represent an opportunity for tourism and landscape diversification: steep cliffs and rugged coastline, little beaches, cultivated terraces, fishing villages, delightful white and pastel-coloured houses, churches, music, craftsmanship and gastronomy.

Along Sorrento and Amalfi coast the suggestive and panoramic “Sentiero degli Dei” (“Path of Gods”) develops for about nine kilometres, from Bommarano (Agerola) to Nocelle (Positano), crossing various villages through Lattari mountains: little houses within caves, an old farmhouse on the edge of a rocky spur, other typical rural buildings, agricultural terraces signed by dry stone walls, with pergola vines and lemon trees, woods and Mediterranean scrub, where Falco peregrinus nests.

Amalfi land frame develops along terraces, property division walls, suggestive pathways, shaping a peculiar landscape through the art and techniques of dry stone walling.

The values associated to the above landscape are related to the economic, socio-cultural and ecological ambits:

- agricultural and pastoral activities, food production and transformation, as well as marketing, tourism development, refurbishment of pre-existent structures, craftsmanship, etc.;
- customs and traditions, family role, social cohesion, historic, symbolic and aesthetic values, spread awareness and shared cultural identity;
- sustainable and resilient construction techniques (integrating and evolving with the environment), water circulation and hydrogeological protection (erosion control, slope stabilization, etc.), biodiversity, etc.

An integrated and interdisciplinary study-in-depth of Amalfi terraced landscape, in terms of actual extension and physical condition of terraces and dry stone structures, and their territorial implication, would allow an appropriate definition of aims/objectives and design of actions/interventions within a strategic vision, shared among different public administrations, stakeholders and citizens<sup>15</sup>.

With reference to the criteria for inscription of dry stone walling on the Representative List of the Intangible Cultural Heritage (UNESCO, 2018), Amalfi dry stone building represents a living tradition, contributing to the sustainable management of cultural heritage, agricultural land, human dwellings and their environment, employs local ma-

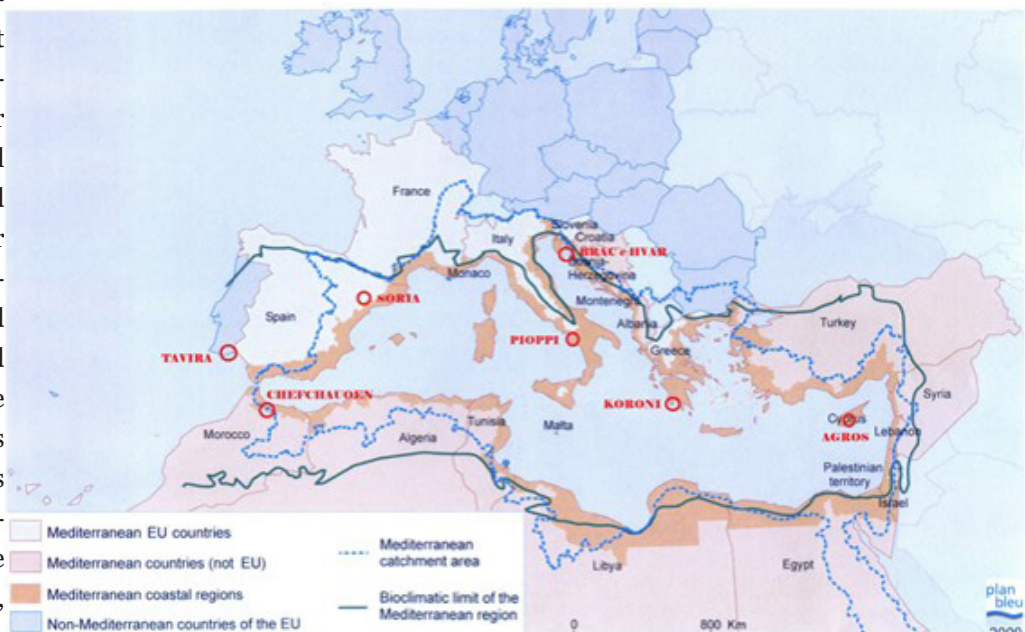
terials and respects local conditions. Nevertheless a stronger attention should be paid to the transmission of related knowledge and skills, through the establishment of a permanent and standardized training system (with appropriate certification). Besides, a more integrated approach to tourism development is needed, through collaboration among local communities, relevant organizations, entrepreneurs and other stakeholders, in the perspective of both cultural involvement (workshops and courses) and recovery/valorisation of dry stone structures for tourist and recreational activities<sup>16</sup>.

Amalfi landscape design and management should develop/evolve on the background of an integrated territorial analysis, related both to physical and socio-cultural features, taking into consideration local communities needs and tourism instances: a structured and shared vision of local development aimed at valorizing naturalistic, cultural and social values.

### 3. Mediterranean diet

In November 2010, the Mediterranean diet was inscribed on the Representative List of Intangible Cultural Heritage of Humanity by the UNESCO Intergovernmental Committee<sup>17</sup>. The above diet involves a set of skills, knowledge, rituals, symbols and traditions concerning crops, harvesting, fishing, animal husbandry, conservation, processing, cooking, and particularly the sharing and consumption of food (UNESCO-ICH, 2013). Eating together is the foundation of the cultural identity and continuity of communities throughout the Mediterranean basin. It is a moment of social exchange and communication, an affirmation and renewal of family, group or community identity. The Mediterranean diet emphasizes values of hospitality, neighbourliness, intercultural dialogue and creativity, and a lifestyle based on the respect for diversity. It plays a vital role in cultural spaces, festivals and celebrations, bringing together people of all ages, conditions and social classes. It involves craftsmanship and production of traditional receptacles for the transport, preservation and consumption of food. Diet is not just a need of the body. Food behaviours are related to landscapes since they impact on the use of resources, choice of cultivations and breeding management. Cooking is a key aspect of the relationship between humankind and nature, through the handling of nature for human needs,

*Fig. 3 - Mediterranean countries and their regions. The centres related to the Mediterranean diet as UNESCO Intangible Cultural Heritage are highlighted in red colour (by Bertini A., on the cartographic source Plan Bleu 2009). The map reports the main indicators defining the "Mediterranean space".*





becoming culture. Women play an important role in transmitting knowledge of the Mediterranean diet: they safeguard its techniques, respect seasonal rhythms and festive events, and transmit its values to new generations (UNESCO-ICH, 2013). Markets also play a key role as spaces for cultivating and transmitting the Mediterranean diet during the daily practice of exchange, agreement and mutual respect.

The recovery of the Mediterranean lifestyle represents a key element of aggregation and social cohesion for communities. Besides it can contribute to the redevelopment of territories which have lost their roles and functions (Bertini, 2015).

The UNESCO recognition of Mediterranean Diet as immaterial cultural heritage was ratified by Campania Region through the regional law n. 6/2012<sup>18</sup>. According to the first article, the Region valorises Mediterranean diet as a development model based on values concerning cultural, social, historical, gastronomic, food and environmental ambits, landscape and customs. The implications rising from the implementation of policies, practices, techniques and methods related to the Mediterranean diet/lifestyle might be very significant.

Diet is an integral component of the historical and cultural identity of the Mediterranean basin, an opportunity for its economic growing and sustainable development.

Most values related to the Mediterranean diet fall within the definition of sustainable diet.

Dietary regimes determine more or less important consequences in terms of water consumption, greenhouse gas emission, biodiversity loss.

A sustainable diet is characterized by low environmental impacts, contributes to food and nutritional safety, to healthy life for present and future generations. A sustainable diet respects ecosystems and biodiversity, is fair and accessible, and optimizes natural and human resources (International Symposium on Biodiversity and Sustainable Diets, FAO, Rome, 2010).

In the light of progressive fossil energy exhaustion, soil consumption, climate change and global warming, unbalanced diets and population growth, sustainable dietary systems have to be promoted all over the world, both within industrialised and developing countries.

Despite the huge number of people dying of starvation, obesity and overweight are growing also in southern Mediterranean countries at low-medium income, turning out as relevant public health questions (Capone & Lapedota, 2013).

#### 4. Conclusions

The safeguarding of appropriate cultivation techniques and food production/transformation contributes to the protection of biodiversity and landscape, through the wise use of resources and sustainable approaches.

Biological agriculture and good agronomical practices allow preserving quality and

quantity of resources, safeguarding and enhancing the territory, soil fertility and carbon sequestration.

The agricultural promotion through the valorisation of ecological agricultural networks, sustainable and multifunctional production, and small-medium sized enterprises can retain people on the territory<sup>19</sup>. Agriculture can still play a primary role, provided the related activities develop within a new productive system, promoting optimization under both qualitative and quantitative perspectives. The local approach, based on the territory, recognizes the endogenous potential, cultural identity and local resources, according to the cultural dimension of sustainability.

The developing of activities related to the green economy, consistent with the objectives of environmental protection - such as ecological agriculture, cultural tourism, energy efficiency and renewable energy, sustainable mobility, appropriate waste management - supports/improves environmental quality and fosters economic activities and employment.

The short chain may re-connect Mediterranean diet, innovative agricultural policies, rural landscape and urban contexts, local communities and tourists/visitors. On the background of a comprehensive regeneration process, involving agricultural landscape, historical settlements, food production/marketing and craftsmanship, rural villages can recover their traditional role within the territorial organization and develop renewed productive, trading and managing functions.

The cultural dimension of towns and villages is to be recovered according to a modern and competitive perspective, promoting traditional activities and economic vitality, and respecting their identities (Vinci, 2007).

Pier Paolo Pasolini wrote that if Italy loses its farmers and artisans, it will have no more history.

During 1980's, Valerio Giacomini and Valerio Romani wrote that we should leave a civilization to our descendants, not only capital. The park, in particular, allows an effective approach to the transformation and management of the territory, without separation among uses, consumption and protection of resources, becoming a place of research and experimentation for the recovery of degraded ecosystems and soil protection, but also a place suitable for planning, architectural, technological and legal experimentation (Giacomini & Romani, 1982).

Little urban/rural settlements can play a key role as laboratories and research centres, for the recovery of wise slowness, thoughtfulness, awareness of (ecological) limits, conviviality and human rhythms, turning from "Time is money" to a Mediterranean approach of "Quality is money" (Cassano, 2005).

The recovery of the Mediterranean lifestyle, through the traditional agricultural terracing system and the Mediterranean diet, turns out as a sustainable approach, promoting belonging and sense of place, socio-cultural development, economic activities, landscape regeneration and environmental protection.

Finally, we underline the need for a greater involvement and actual participation of local communities within the processes of landscape valorisation: not only public admi-

nistration and experts, but all the stakeholders (farmers, tourist operators, etc.), associations, citizens and visitors.

## ENDNOTES

1 Both the authors Antonio Bertini and Candida Cuturi authored the Abstract, Section 1 (Introduction), Subsection 2.1 (The art of dry stone walling, knowledge and techniques), Subsection 2.2 (Dry stone walling in the Italian context), Section 3 (Mediterranean Diet) and Section 4 (Conclusions); Candida Cuturi authored Subsection 2.3 (Dry stone walling along the Amalfi coast).

2 The decision was unanimously approved by 24 Member States on the occasion of the thirteenth session of the Intergovernmental Committee for the Safeguarding of the Intangible Cultural Heritage, held in Port Louis at the end of November 2018. Cf. <https://ich.unesco.org/>

3 The “vite ad alberello” of Pantelleria was inscribed in the World Heritage List in November 2014. It is a creative and sustainable cultivation introduced by Phoenicians (VII-IV century B.C.). Actually the technique consists of levelling the soil and digging a hollow to plant the vine, then the main stem is carefully pruned to produce six branches, forming a bush, and the hollow is constantly reshaped, so that the plant is able to survive the wind always blowing on the isle (“Pantelleria” derives from the Arab denomination “Bent-el-Rhia”, that is “daughter of the wind”). Cf. Cappadona, 2017; Decision of the Intergovernmental Committee: 9.COM 10.21 (<https://ich.unesco.org/>).

4 While dry stone walling concerns particularly the Northern Mediterranean Sea, earthen architecture is widely spread within the Southern area, as an environmentally friendly approach to be considered as expression of tangible and intangible cultural heritage. For in-depth study on the subject: Bertini A., Cuturi C., Caruso I. & Vitolo T. (2018) “Preserving and valorizing the settlement system of southern Morocco”, in *Heritage 2018. Proceeding of the 6th International Conference on Heritage and Sustainable Development*, Granada, June 2018, pp. 1895-1905.

5 Cf. Signorile L. (2018) I muretti a secco riconosciuti patrimonio dell’Umanità, *National Geographic Italia* (Francesco Danieli about dry stone walling as World Heritage, November 2018).

6 The International Union for the Conservation of Nature (IUCN) defines Nature-Based Solutions as alternative solutions for conserving, sustainably managing and preserving/recovering natural ecosystems, fronting societal challenges in effective and adaptable way.

7 Messapians were an ancient population of Puglia, having connections with Greeks. For in-depth study: Valli D. (1991), “La tradizione messapica nella moderna letteratura del Salento”, in Stazio A. & Ceccoli S. (eds), *I Messapi. Atti del trentesimo convegno di studi sulla Magna Grecia*, Taranto-Lecce 4-9 ottobre 1990, pp. 9-31; Mastronuzzi G. (2009), “La Puglia dall’età del ferro alla conquista romana: aspetti dell’identità culturale e contatti con la penisola balcanica”, in Federica G. (ed), *Adriatico di molte genti. Novità archeologiche tra Veneto, Marche, Abruzzo e Puglia, AnteQuem*, Quaderni n. 2, 2009, pp. 75-109.

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10 Cf. Regolamento (CE) N. 1356/2001 della Commissione (4.7.2001), *Gazzetta ufficiale delle Comunità europee*, 5.7.2001, L182/25-26.

11 Cf. Squires N. (2017), “How climate change threatens famed Amalfi Coast”, *The Christian Science Monitor*, January 1, 2017.

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14 Cf. Ferrigni F. (2013). “Il Piano di gestione del sito Unesco “Costiera Amalfitana”: Problemi, finalità, struttura”, in CUEBC, Il futuro dei territori antichi. Available at [www.univeur.org](http://www.univeur.org)

15 Internal strengths and weaknesses, as well as external opportunities and threats, should be properly identified (SWOT Analysis). Integrated evaluation approaches may be implemented for terraced landscapes, resorting to quantitative/qualitative methods. Some research on multidisciplinary methodologies for analysis, protection and valorisation of terraced landscapes has been carried out (by Barbera G. and Cullotta S., Agnoletti M., Conti L. and Santoro A., etc.).

16 The Network of tourism development Costa d’Amalfi is committed into the enhancement/regeneration of pre-existent building heritage, preservation of local traditions and excellence.

17 The first acknowledgment of the Mediterranean Diet as UNESCO Intangible Cultural Heritage was taken on the basis of a proposal by Spain (Soria), Greece (Koroni), Italy (Cilento) and Morocco (Chefchaouen). Cf. Convention for the Safeguarding of the Intangible Cultural Heritage, Intergovernmental Committee for the Safeguarding of the Intangible Cultural Heritage, Fifth session, Nairobi, Kenya, 15 to 19 November 2010, Decision 5.COM 6.41. Successively, in 2013, other three countries added: Cyprus (community of Agros), Croatia (Brač and Hvar), and Portugal (Tavira) (UNESCO-ICH, 2013).

18 Campania regional law n. 6, 2012, 30 March, was published on Bollettino Ufficiale della Regione Campania n. 22, 2012, 10 April.

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## Contract farming and sustainable agricultural development: some issues

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### Abstract

This paper deals with the concept of contract farming in the purview of National Agricultural Policy (2000) which encouraged private participation through contract farming. The conception of contract farming is nothing new in India but it gets momentum in the era of agricultural globalization. As an alternative method of farming it becomes popular to Indian farmer. The issues relating to contract farming such as sustainable agricultural development, advantages to the farmers and sponsors, problems faced by the farmers and sponsors, problems to introducing contract farming in India, governments responsibility etc. have been discussed in this article elaborately. The study reveals that in Indian context introduction of contract farming has two fold effects, positive and negative in favour of farmers and sponsors. But in the perspective of sustainable agricultural development it has a significant impact.

### KEYWORDS:

*Contract farming, Sustainable agricultural development, sponsors, farmers, small-holdings, inputs, legal framework, pre-agreed price*

### Introduction

It is fact that the majority of poor people in the world live in rural areas and are dependent on agriculture for their livelihoods and sustenance. Nevertheless, the agricultural sector has often been neglected as an important mechanism for reducing poverty and promoting development (World Bank, 2008; United Nations, 2009). Agriculture

is an age-old means of livelihood for millions of Indians and its structure underwent rapid changes during the nineties both due to the pressure of commercialisation and increased dependence on trade. This was fuelled by many overt and covert changes in the sector, but diversification of crops along with the advent of WTO and liberalisation policies were the main players in the structural change. During post economic reforms (1991) period Indian agriculture is facing a complex situation, more than ever before. In consequence of that contribution of agriculture and allied sector to GDP has declined over the years. The contribution of agricultural sector to GDP has declined from 30.3 per cent in 1993-94 to 13.9 per cent in 2013-14, though 67 per cent of total Indian population still depends on agriculture. Parenthetically, in the era of globalization and liberalization, growth of agricultural sector has declined from 9.6 per cent in 1996-97 to 6.2 per cent in 1998-99 and further to 4.6 per cent in 2013-14 (CSO, 2013-14). This drift clearly indicates that Indian economic reforms process has not boosted the agriculture sector. Agriculture in India is not just an industry but is a way of life, it provides sufficient employment basically in rural area and also provides agricultural inputs to the agriculture-based food industries. Timely and adequate quantity of good quality agricultural inputs is a sine qua non for smooth functioning of the agro industries. This underlying paradox of the Indian agricultural scenario has given birth to the concept of contract farming, which promises to provide a proper linkage between the farm and market, promote high degree of competition at the supply and market end and minimize intermediaries in order to increase farmers' income.

During the tenure of the Left Front, Contract Farming was recommended in the McKinsey Report submitted to the Govt. of West Bengal. India's National Agricultural Policy (2000) states, "Private sector participation will be promoted through contract farming and land leasing arrangements to allow accelerated technology transfer, capital inflow and assured market for crop production, especially of oilseeds, cotton and horticultural crops". In view of the recent decision of the Govt. of India permitting entry of FDI in multi-brand retail sector, contract farming has become relevant. The colonial period saw the introduction of cash crops such as tea, coffee, and rubber, poppy and indigo in various parts of the country, mostly through a central expatriate-owned estate surrounded by small out growers' model. Indian Tobacco Company (ITC) introduced cultivation of Virginia tobacco in Coastal Andhra Pradesh in the 1920's incorporating most elements of a fair contract farming system and met with good farmer response. This was replaced by auctions in 1984. The Pepsico introduced tomato cultivation in Punjab in the 1990's under farming to obtain inputs for its paste-manufacturing facility established as a pre-condition to its entry in to India. This was sold to Hindustan Lever in 2000, which had earlier acquired the Kissan Karnataka. Big corporate houses such as Hindustan Lever, Pepsi Foods, A.V. Thomas, Daburs, Thapars, Marico, Godrej, Mahindra, Wimco, SAB miller etc. undertake contract farming for many crops apart from several small players (Ashokan and Singh, 2003). Contract Farming was the strategy of choice for almost all food processing projects contemplated in the 1980's and 1990's. Contract



Farming is again vogue, and even tried for bulk production of subsistence crops, such as paddy rice, maize and wheat. Contract Farming is now considered to be a corrective to market imperfections and serving a useful purpose in India in its own limited sphere. Contract Farming has been promoted in the recent three decades as an institutional innovation to improve agricultural performance in less developed countries. This system was accepted and used as one of the promising institutional frameworks for the delivery of price incentives, technology and other agricultural inputs. Local Governments, private local firms, Multinational companies, some international aid and lending agencies etc have been involved in these contract farming schemes (Glover 1994).

### **Review of Literature**

In this phase, an attempt has been made to review some of the existing literature on contract farming conducted in different countries in the world and also in India.

SPICE (2003) research examines that to establish an agrarian economy that ensures food and nutrition security to a population of over a billion, raw material for its expanding industrial base, surpluses for exports, and a fair and equitable rewarding system for the farming community, 'commitment driven' contract farming is no doubt a viable alternative farming model, which provides assured and reliable input service to farmers and desired farm produce to the contracting firms.

In his research paper Sukhpal Singh (2005) concludes by drawing a lesson for agribusiness policy for contract farming to play an effective role in agricultural development in the state.

Braja Bandhu Swain (2007) opines that contract farming can change the cropping pattern of agriculture and farmer can earn more income, which leads to develop the economy.

According to Sununtar Setboonsarng (2008) success of contract farming may be dependent on sound managerial skills and the demonstration of corporate social responsibility and cultural understanding on the part of the firm.

Martin Prowse (2008) identified that there are also risks associated with contract farming and suggests that such risks can be reduced if a greater focus is put on strengthening market-oriented producer organisations and creating mechanisms for resolving disputes between farmers and firms.

Jos Bijman (2008) proves that contract farming is becoming more important for international food chain, rise super markets, supply chain management (quality, logistics,

information).

Namrata Acharya (2012) expressed in her article that contract farming under the name of collaborative or partnership farming, is gaining popularity among farmers in West Bengal.

Jayati Ghosh (2013) warned in her article that relying only on contract framing to solve the current agrarian problems in the country is futile. Instead, if it is not properly controlled and regulated and if it adds to the reneging of responsibility by state actors, it is likely to intensify such problems.

Sita Ram and R. C. Kumawat (2013) evaluated contract farming as a way of providing earlier access to credit, input, information and technology and product markets for the small scale farming structure. Contract farming might also be seen as a way or as a part of rural development and promoted to improve agricultural performance especially in Third World Countries.

For successful implementation of contract farming Preetinder Kaur (2014) recommends that there should be proper co-ordination between farmers and firm then both will be acted in organised manner and advisable for sides.

Discussing about the problems and prospects of contract farming in India, Joydeb Sarkhel (2014) apprehended that since the company is financially stronger than individual farmers the terms of the contract may go against the farmers.

### **Objective of the Study**

The objectives of the paper are to discuss the following points:

- Concept of contract farming
- Concept of Sustainable agricultural development
- Advantages to the farmers
- Problems faced by farmers
- Advantages to the sponsors
- Problems faced by sponsors
- Problems of contract farming in India
- Government's responsibility etc.

### **Methodology**

The study is purely based on the information collected from different sources like web-

sites, articles published in reputed national and international journals, news papers and reputed reference books related to this field. Phase wise discussion of different aspects relating to contract farming in India has been done to realise the objectives of the study. Finally the author reaches to the conclusion and recommends something for better implementation of contract farming and sustainable agricultural development.

### **Idea of Contract Farming**

Agricultural production carried out according to an agreement between a buyer and farmers, which establishes conditions for the production and marketing of a farm product or products. Usually, the farmer agrees to provide agreed quantities of a specific agricultural product that should meet the quality standards of the purchaser and be supplied at the time determined by the purchaser as a result the purchaser gets a guaranteed, steady supply of produce. Consecutively, the purchaser commits to purchase the product and, in some cases, to support production through supply of farm inputs, land preparation and the provision of technical advice. Contract farming is an agreement between one and more farmer(s) and a contractor for the production and supply of agricultural products under forward agreements frequently at predetermined prices (FAO, 2001). It is a system for the production and supply of agricultural or horticultural produce under forward contracts between farmers and contracting company. The essence of such an arrangement is the commitment of the farmer to provide an agricultural commodity of a certain type, at a time and a price, and in the quantity required by a known and committed contracting company. Contract farming is a contract between a farmer and a purchaser established in advance of the growing season for a specific quantity, quality, and date of delivery of an agricultural output at a price or price formula fixed in advance. The contract provides the farmer with the assured sale of the crop and at times provides for technical assistance, credit, services, or inputs from the purchaser (Binswanger et al., 1995). Thus, under contract farming the contractor supplies all the inputs while the farmer supplies land and labour.

Contract farming is an alternative method of farming, very useful in developing country like India. Farmer suffers from the problem of assured market, again agro-based and food industry requires inputs of good quality agricultural produce. Contract farming builds a bridge between the farm and the industry to fulfill their needs. It also provides a linkage between agriculture and processing industries. Private investment in agriculture will increase through contract farming and in consequence of that financial burden of central and state governments will be reduced. Farmers find a steady source of income through contract farming, not only that it will generate gainful employment in rural areas. Contract farming is needed to bring about a market focus in terms of crop selection by Indian farmers and to trim down migration of labour from rural areas to urban areas.

### Advantages to the Farmers

- The farmers will be exposed to world class mechanized agro-technology which will increase productivity.
- The farmers obtain a guaranteed and fixed pricing structure for their product.
- The farmers get access to reliable markets.
- Contract farming usually allows farmers access to some form of credit to finance production inputs.
- The farmers get healthy disease-free nursery, agricultural implements and improved technology from the contracting company.
- There will be crop monitoring on a regular basis, Technical advice will be provided free of cost at the doorstep of the farmer.
- The skills the farmer learns through contract farming may include record keeping, the efficient use of farm resources, improved methods of applying chemicals and fertilizers, knowledge of the importance of quality and the characteristics and demands of export markets.

### Problems Faced by Farmers

- Farmers entering new contract farming ventures should be prepared to balance the prospect of higher returns with the possibility of greater risk.
- The introduction of a new crop to be grown under conditions rigorously controlled by the sponsor can cause disruption to the existing farming system.
- The introduction of sophisticated machines (e.g. for transplanting) may result in a loss of local employment and overcapitalization of the contracted farmer.
- Management may be tempted to manipulate quality standards in order to reduce purchases while appearing to honour the contract.
- Problems occur when staff responsible for issuing contracts and buying crops exploits their position. Such practices result in a collapse of trust and communication between the contracted parties and soon undermine any contract.
- Allowing only one purchaser encourages monopolistic tendencies, particularly where farmers are locked into a fairly sizeable investment, such as with tree crops, and cannot easily change to other crops.
- Availability of credit may sometime be the cause of farmers' indebtedness and over reliance on advances.

### Advantages to the Sponsors

- The sponsor will get uninterrupted and regular flow of raw materials for its processing plant.



- The sponsor will get protection from fluctuation in market pricing as the company enters into forward contract with the farmers.
- It will be possible for the sponsor to formulate long term planning.
- If the move is successful for one crop it can be extended to other crops. As a result the sponsor can diversify its product base and farmers can also produce several products.
- The sponsor gets a dedicated supplier base. The contract farming builds long term commitment between the sponsor and the farmers. It also generates goodwill for the organization.

### **Problems Faced by Sponsors**

- Farmers must have suitable land on which to cultivate their contracted crops. Problems can arise when farmers have minimal or no security of tenure as there is a danger of the sponsor's investment being wasted as a result of farmer-landlord disputes.
- Problems can arise when management chooses farmers who are unable to comply with strict timetables and regulations because of social obligations. Promoting agriculture through contracts is also a cultural issue. In communities where custom and tradition play an important role, difficulties may arise when farming innovations are introduced.
- If 'farmer discontent' not readily addressed, such circumstances will cause hostility towards the sponsors that may result in farmers withdrawing from projects.
- The sale of produce by farmers to a third party, outside the conditions of a contract, can be a major problem. Extra-contractual sales are always possible and are not easily controlled when an alternative market exists.
- Farmers are tempted to use inputs supplied under contract for purposes other than those for which they were intended. They may choose to use the inputs on their other cash and subsistence crops or even to sell them.

### **Problems of Contract Farming**

Presently contract farming ventures in India are facing some basic problems discussed below:

- There is no credible enforcement mechanism for contract farming in India.
- Since the size of the holdings is small the company will have to enter into contract with a large number of farmers which increases costs of the company.
- There is a lack of comprehensive crop insurance scheme in India.
- Even in the absence of any legal framework the Company can take certain measures to make the system effective such as maintain a proper database on farmers, publicize the names of defaulter, introduce a system of incentives/ rewards and encourage farmers to sell their surplus output in the open market.

## Sustainable Agriculture Development

Sustainable agriculture seeks to sustain farmers, resources and communities by promoting farming practices and methods that are profitable, environmentally sound and good for communities. Sustainable agriculture fits into and complements modern agriculture, rewarding the true values of producers and their products. It draws and learns from organic farming. It works on farms and ranches large and small, harnessing new technologies and renewing the best practices of the past. It is economically viable, socially supportive and ecologically sound.

According to Dr. John E. Ikerd, Extension Professor at the University of Missouri, “A sustainable agriculture must be economically viable, socially responsible and ecologically sound. The economic, social and ecological are interrelated, and all are essential to sustainability. An agriculture that uses up or degrades its natural resource base, or pollutes the natural environment, eventually will lose its ability to produce. It’s not sustainable. An agriculture that isn’t profitable, at least over time, will not allow its farmers to stay in business. It’s not sustainable. An agriculture that fails to meet the needs of society, as producers and citizens as well as consumers, will not be sustained by society. It’s not sustainable. A sustainable agriculture must be all three - ecologically sound, economically viable and socially responsible. And the three must be in harmony.”

Sustainable agriculture is a type of agriculture that focuses on producing long-term crops and livestock while having minimal effects on the environment. This type of agriculture tries to find a good balance between the need for food production and the preservation of the ecological system within the environment. In addition to producing food, there are several overall goals associated with sustainable agriculture, including conserving water, reducing the use of fertilizers and pesticides, and promoting biodiversity in crops grown and the ecosystem. Sustainable agriculture also focuses on maintaining economic stability of farms and helping farmers improve their techniques and quality of life.

There are many farming strategies that are used that help make agriculture more sustainable. Some of the most common techniques include growing plants that can create their own nutrients to reduce the use of fertilizers and rotating crops in fields, which minimizes pesticide use because the crops are changing frequently. Another common technique is mixing crops, which reduces the risk of a disease destroying a whole crop and decreases the need for pesticides and herbicides. Sustainable farmers also utilize water management systems, such as drip irrigation, that waste less water.

### Positive aspects of Sustainable agriculture

- *Human health:* crops grown through sustainable agriculture are better for people.

Due to the lack of chemical pesticides and fertilizers, people are not being exposed to or consuming synthetic materials. This limits the risk of people becoming ill from exposure to these chemicals. In addition, the crops produced through sustainable agriculture can also be more nutritious because the overall crops are healthier and more natural.

- *Environment:* Sustainable agriculture uses 30% less energy per unit of crop yield in comparison to industrialized agriculture. This reduced reliance on fossil fuels results in the release of less chemicals and pollution into the environment. Sustainable agriculture also benefits the environment by maintaining soil quality, reducing soil degradation and erosion, and saving water.

In addition to these benefits, sustainable agriculture also increases biodiversity of the area by providing a variety of organisms with healthy and natural environments to live in.

Sustainable agriculture is often cited to encompass of three main goals namely economic efficiency, environmental quality and social responsibility (D'Silva et al., 2011a). Despite the diversity in conceptualizing sustainable agriculture, there is a mutual agreement on the keys for sustainable agriculture successes namely (i) maintenance of environmental quality, (ii) economically justifiable through stable plant and animal productivity, and (iii) socially desirable (Sharghi et al., 2010). Even though a sustainable farm must possess both economic and environmental successes nonetheless it must not leave behind the role of social capital (such as family quality of life, human health, relationships based on family and community) (Asadi et al., 2008). Previously, efforts to develop the agricultural sector depended heavily on conventional ways to produce, increase and sustain food production. The usage of chemical fertilizers was much needed by that time in order to supply plant nutrients and chemicals to combat pest and diseases. However, in recent years, as a result of increasing awareness on health and environment issues, systematic programs have been introduced to optimize the use of resources on a sustainable basis including the recycling of waste products for food production and environment protection, and an increasing commitment to reduce reliance on excessive chemical inputs in agriculture (Liaghat and Balasundram, 2010). Sustainability is the way to provide more healthy foods in the future considering the increasing population and growing demand of agricultural products (Sharghi et al., 2010). Also, sustainable agriculture has been seen as contributor to generate more economic and quality life to the farmers. In a way to make it become reality, the group that is mainly responsible to carry out sustainability in agriculture is the farmers.

## Conclusions

The study reveals that, while contract farming can be effective in introducing new technologies and providing external inputs to farmers, danger lies in firms extending tech-

nologies that bring financial benefits in the short-term but result in negative long-term health and environmental impacts. In addition, contract farming is not appropriate for all types of crops. To have a significant poverty impact, crops produced under contract farming should be labour-intensive rather than input-intensive and should be appropriate for production on small plots of land. Many developing countries lack the laws and ensuing legal framework to support contractual agreements, and thus contracts may not be easily enforceable or legally binding. As a result, it is inevitable that distrust and the potential for opportunistic behaviour exist between firms and farmers, undermining the viability of contracting. Modern contract farming is mutually advantageous. Since the company is financially stronger than individual farmers the terms of the contract may go against the farmers. Herein the Govt. will have to come forward. The success of contract farming may be dependent on sound managerial skills and the demonstration of corporate social responsibility and cultural understanding on the part of the firm. Finally, sincere efforts between the companies and farmers will secure sustainability for all parties with a unique vision for agricultural development.

### Recommendations

The study reveals some problems which hinders the wide implementation of contract farming in India. The state of affairs led the author to several implications for the concern authorities, particularly government of India. Suitable steps should, therefore, be taken by the respective authorities to remove the existing drawbacks. The following recommendations are made in this regard.

- State level legislation should be made for the regulation of contract farming. It would help to redress the disputes occurred between contracting company and farmer.
- The government should allow and encourage contract farming organizations to take out realistic and deregulated crop insurance policies.
- The government should give tax concessions or tax holidays to the companies engaged in contract farming to encourage their participation.
- The government should instruct the Indian Council of Agricultural Research (ICAR) and the University system to provide region specific crop solutions and make them part of public information domain.
- The government should take initiatives to import of new improved varieties of seeds/saplings/hybrids and technology for contract farmers/contracting companies.

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## Campania a rischio idrogeologico

di *Ferdinando Maria MUSTO*

*Esempio di urbanizzazione in una zona a rischio.*



Si sente tanto parlare di dissesto e di rischio idrogeologico, senza considerare le cause di tali eventi e dando visibilità solo agli effetti spesso nefasti. È piuttosto semplice interrogarsi a posteriori su cosa non funzioni, o peggio a catastrofe già avvenuta. Di mitigazione del dissesto e del rischio occorre parlarne sempre, con particolare attenzione a questa importante problematica. Il rischio idrogeologico in Italia è diffuso in maniera capillare su tutto il territorio e si presenta in modo diverso a seconda dell'assetto geo-

morfologico e litologico della zona di riferimento. Nella black list delle regioni a rischio di dissesto idrogeologico, la spiacevole medaglia di bronzo va alla Campania. Il rapporto dell'Ispra "Dissesto idrogeologico in Italia" (2018) parla chiaro: rispetto all'anno precedente, il rischio è cresciuto fino al 91%. È impossibile rimanere indifferenti davanti a statistiche simili. La preoccupazione, inoltre, cresce esponenzialmente se si osservano le suddette ricerche con maggiore attenzione. Il 91% del territorio con elevato rischio idrogeologico ospita 499 scuole, 1288 beni culturali e 18.451 imprese, che convivono costantemente con questa spada di Damocle sulla testa: infatti, oltre 544.000 persone, cioè il 10% della popolazione residente nella regione, è soggetta a tali pericoli. Nelle province di Napoli e Salerno sono più di 30.000 le famiglie a rischio: quelle salernitane sono 36.742, il 9,1% in termini di indici nazionali. Come se non bastasse, Salerno possiede anche il numero più elevato di edifici a rischio frane (32.199, il 12,8%). Questa è la prima provincia per unità locali di imprese in pericolo (6.394, l'8,2%), immediatamente seguita da Napoli. Le stime non sorprendono, dal momento che Salerno è la quarta provincia italiana per numero di eventi franosi nel periodo 2010-2016 (dopo Bolzano, Messina e Genova). Le aree soggette a rischio idrogeologico si suddividono in:

- aree a rischio per fenomeni di esondazione di bacini idrografici
- aree a rischio per fenomeni di instabilità dei versanti

Le alluvioni e le frane rappresentano delle calamità naturali che si ripetono con maggior frequenza, e che causano (dopo i terremoti) il maggior numero di vittime e di danni. È vitale veicolare l'attenzione pubblica su questi dati così allarmanti, non dimenticando mai l'equazione alla base del rischio di dissesto idrogeologico:

$$\text{Rischio} = \text{Pericolosità} \times \text{Vulnerabilità} \times \text{Esposizione}$$

- Rischio (risk): possibilità di una perdita (vite, proprietà, capacità produttive, funzionalità del territorio);
- Pericolosità (hazard): esprime la probabilità che un dato fenomeno potenzialmente distruttivo si verifichi con una certa intensità, in una determinata area, in un dato intervallo di tempo. Può essere espressa in una scala percentuale da 0% (nessuna probabilità di accadimento) a 100% (certezza dell'accadimento);
- Vulnerabilità: esprime la propensione di un certo elemento (popolazione umana, edifici, infrastrutture, attività economiche, servizi, beni naturali e culturali, ...) ad essere danneggiato da un dato fenomeno a cui l'elemento stesso è esposto. Può essere espressa in una scala percentuale da 0% (nessuna vulnerabilità) a 100% (vulnerabilità totale). La vulnerabilità è quindi una misura della fragilità, della impossibilità di resistere ad un evento calamitoso da parte di un elemento esposto in funzione delle proprie caratteristiche.
- Valore o valore esposto o esposizione o elementi a rischio (element at risk): costituisce l'insieme degli elementi a rischio presenti nell'area esposta all'evento, quantificati in termini relativi (valore venale) o assoluti (numero di persone, di edifici, di strade, ...).

Dalla combinazione della vulnerabilità con il valore degli elementi a rischio si ottiene il danno potenziale, che risulta indipendente dalla probabilità di frequenza del fenomeno idrologico o idrogeologico preso in considerazione.

In ultimo, la definizione del rischio totale esprime il valore atteso delle perdite umane, dei feriti, dei danni alle proprietà e al patrimonio culturale e ambientale, nonché delle perturbazioni alle attività economiche dovute ad un particolare fenomeno naturale. Si ottiene incrociando il danno potenziale con la pericolosità che un evento accada.

Una volta focalizzato il problema, è importante concentrare le forze sulla possibile soluzione. Per una corretta ed efficace pianificazione, è prima di tutto doveroso basarsi sugli studi geologici finalizzati a conoscere il territorio. Nell'analisi del rischio assume particolare rilievo scientifico l'identificazione e la comprensione dei livelli di pericolosità: su questo aspetto le Autorità di Bacino hanno investito gran parte delle loro risorse, in termini sia analitici che valutativi. Gli elaborati prodotti da questi enti italiani, nella stesura dei Piani Stralcio di Bacino per l'Assetto Idrogeologico "PSAI", evidenziano le principali differenze metodologiche che si manifestano proprio quando si tratta di determinare la pericolosità nell'ottica della salvaguardia del territorio e della mitigazione del rischio idrogeologico.

Le informazioni sulla pericolosità ed il rischio a cui una certa area è esposta sono rappresentate solitamente per mezzo di carte in cui vengono discretizzati, secondo classi

diverse, gli altrettanto differenti livelli di pericolosità o rischio. Questa particolare classificazione viene chiamata zonazione. Lo studioso Varnes, nel 1984, fornì la seguente definizione del termine: “The term zonation refers to the division of land into homogeneous areas or user defined domains and the ranking of these are according to their degrees of actual or potential hazard from landslides”.

È essenziale ricordare che, a livello di pianificazione, le carte di pericolosità comportano effetti normativi di grande rilevanza, poiché sulle zone individuate vengono imposti vincoli e limitazioni d'uso distinti secondo il grado di emergenza. Per questi motivi, negli ultimi anni i governi e gli istituti di ricerca hanno investito tempo e risorse nel tentativo di produrre cartografie che rappresentino la distribuzione spaziale della pericolosità, perfezionando dei metodi e delle tecniche che occupano da vent'anni le pagine delle principali riviste scientifiche del settore. Nel campo dell'analisi spaziale della pericolosità, un contributo fondamentale è stato dato dal progressivo sviluppo delle capacità di calcolo dei computer e dalla possibilità di utilizzare un sistema informativo computerizzato chiamato “GIS”, il quale permette l'acquisizione e l'analisi di informazioni derivanti da dati geografici georeferiti. Infatti, il GIS (Geographic Information System), secondo la definizione di Burrough (1986), è composto da una serie di strumenti software volti ad acquisire, memorizzare, estrarre, trasformare e visualizzare dati spaziali dal mondo reale. È quindi, in sostanza, un sistema informatico in grado di collegare le informazioni di tipo alfanumerico con quelle di tipo grafico, inserendole in un database relazionale.

I principali vantaggi derivanti dall'utilizzo di software GIS sono:

- l'opportunità di adottare tecniche di analisi altrimenti non utilizzabili, in virtù della capacità di eseguire calcoli su un gran numero di parametri e tabelle;
- la possibilità di sovrapporre ed incrociare dati territoriali (map overlay), consentendo di collegare una molteplicità di informazioni legate al territorio;
- comunicazione e condivisione delle informazioni con altri utenti.

La consultazione degli elaborati del PSAI (relazioni e cartografie) forniscono uno strumento conoscitivo, normativo e tecnico-operativo mediante il quale sono pianificate e programmate le azioni, le norme d'uso del suolo e gli interventi riguardanti l'assetto idrogeologico per l'intero territorio di competenza. La cartografia ci permette una più diretta interpretazione delle classi di rischio/pericolosità, che vengono rappresentate a scala di bacino, su base cartografica C.T.R., con una definizione di un Piano urbanistico di Area vasta. Costituiscono inoltre un contributo ai fini del Piano di Emergenza Comunale, di cui alla L.n.100/2012. Nel quadro della strategia del Piano, si sottolinea il richiamo alla necessità dell'adeguamento degli strumenti urbanistici (PUC) al PSAI e, pertanto, il suo effettivo recepimento da parte degli Enti locali.

La pianificazione d'emergenza e l'organizzazione delle strutture e delle risorse umane hanno un ruolo fondamentale ai fini della gestione del rischio in chiave preventiva. Ciò viene sancito esplicitamente dalla normativa comunitaria, nazionale e regionale. È per questo che in Campania, negli ultimi anni, sono state programmate risorse a più riprese

a supporto delle province e dei comuni per la predisposizione, applicazione e diffusione dei piani di protezione civile. Si sottolinea che a supporto alle Province ed ai Comuni per la pianificazione della Protezione Civile in aree territoriali vulnerabili, sono pubblicate le “Linee Guida per la redazione dei Piani di Emergenza Comunale”, che costituiscono il supporto tecnico-operativo per l’elaborazione della pianificazione di emergenza e di Protezione Civile in ambito comunale. È con l’elaborazione del Piano di Emergenza, che coordina gli altri strumenti di governo del territorio, che si realizza lo strumento di gestione del rischio idrogeologico finalizzato alla salvaguardia della vita umana.

Dai dati disponibili, si evince che non sono avvenuti sostanziali cambiamenti, anzi risulta ancora che molti comuni non sono dotati di piani d’emergenza. In Campania risultano 339 comuni (73%) dotati di un piano aggiornato in conformità alle disposizioni normative, 79 comuni (14%) con un piano non aggiornato, 54 comuni (10%) privi di piano e 18 comuni (3%) non rilevati. Tale ritardo nella pianificazione evidenzia purtroppo ancora una scarsa attenzione da parte dei diversi amministratori pubblici locali rispetto alla necessità di predisporre sistemi di gestione dell’emergenza che siano in grado di salvaguardare l’incolumità delle comunità sottoposte a condizioni di rischio.

In conclusione, si ricava un importante insegnamento: è necessario saper gestire i casi di emergenza prima che questi eventi catastrofici avvengano. Bisogna imparare a prevenire, costruendo in luoghi meno pericolosi e rispettando i vincoli esistenti disciplinati dagli strumenti urbanistici. Appare comunque evidente che il livello di rischio a cui può essere esposto un territorio non può essere calcolato con esattezza matematica. Calamità come le flash floods, ad esempio, non sono prevedibili se non attraverso valutazioni probabilistiche. In termini tecnici, è importante capire quindi che bisogna ottimizzare la capacità di previsione degli eventi estremi, implementando sistemi di “allarme idrologico immediato”. Per fare ciò, è necessario realizzare strade, ponti e case più resistenti, migliorare le tecniche e le strategie d’intervento della protezione civile e adottare i Piani Comunali di Protezione Civile “PEC”.

Va sottolineata, infine, la funzione pubblica del piano. Tale progetto di pianificazione non costituisce un mero strumento tecnico, esclusivamente riservato agli addetti ai lavori. Il documento, al contrario, dev’essere adeguatamente diffuso tra la cittadinanza, non solo per sensibilizzare i cittadini verso i rischi della realtà locale, ma soprattutto per informare e diffondere la conoscenza nel campo della gestione del rischio.



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