Water and food security
A vital challenge in the Mediterranean region

On the occasion of World Water Day, 22 March 2013, this note presents the results of the Seminar on Water and Food Security in the Mediterranean area (SESAME), held on 21 and 22 February 2013 in Montpellier (France). SESAME provided an opportunity to share a concern: food and water security in the already fragile Mediterranean region are greatly threatened by global changes and by mismanagement of urban, agricultural and rural development. It concluded that there was an urgent need for a paradigm shift at all levels of territorial governance (local, regional, national, Euro-Mediterranean).

Water and food security in the Mediterranean region: an alarming situation

Currently 900 million people worldwide – 75% in rural areas – do not have access to enough food. The situation in the Mediterranean region is worrying. Although the Middle East-North Africa (MENA) region accounts for ’only’ 4% of the world population suffering from hunger (37 million in 2010), it is the area where undernourishment increased the most between 1990 and 2010 (+50% according to FAO). Population growth is still high in the region, whereas production and agricultural income are hampered by mismanagement of rural development, water scarcity and increasing aridity. Food security is therefore mainly assured through food imports. Over the last 50 years, cereal imports in the region have increased 20-fold (70 million tons in the MENA region in 2011). In 2007-2008, the rise in world agricultural prices led to riots in several countries and placed a considerable burden on government finances to pay food bills ($30 billion deficit in 2011 in the MENA region), which resulted in several GDP percentage points going into food and energy subsidies.

In this situation, how can access to food for households, as well as social and political stability, be assured? While there is scope for increasing production and income, the question of water availability quickly becomes a crucial issue.

Water resources are indeed unevenly distributed in both time and space, while aridity, shortages and droughts are worsening. To compensate for the problem of water stress, irrigated areas have doubled between 1960 and 2005, boosting crop yields. However, as water resources are limited in developing regions, the overexploitation of groundwater reserves has increased, along with water and soil salinization, and sometimes pollution. Moreover, vulnerable areas (pastoral, semi-arid, mountains), where a high percentage of rural people live, have remained on the sidelines of progress. Unequal access to land, farm fragmentation, rural insecurity, desertification and dam silting are still increasing in Southern Mediterranean countries, while abandonment of agricultural lands continues in Northern Mediterranean countries.

Current developments are not reassuring. Uncontrolled urbanization is reducing the area of arable land. Population growth, changing lifestyles and the development of tourism are significantly increasing the overall demand for water, regardless of its uses, thus reducing the allocation to agriculture. Already very perceptible, climate change will reduce water resources by as much as 30%, increase the aridity of the Mediterranean climate and seriously threaten the Nile Delta region. Will this lead to massive population migrations or rather to the emergence of new solutions to meet the challenges?

Key figures

3 000 l/day: the average quantity of water (rainfall and irrigation) used by plants and needed to produce enough food to feed one person
250 kg/year: the average amount of food wasted per person per year in Mediterranean Basin countries
80%: the proportion of degraded land along the southern shores of the Mediterranean
30%: the share of water from non-sustainable sources used in Maghreb
136 km/year: the net amount of ’virtual’ water imported into the Mediterranean region in the form of food products
63 million: the additional number of people in the region to be fed in 15 years
290 million: the number of people living in the southern Mediterranean coastal region who will experience water shortages (<500 m³/person) in 2050 (currently 64 million)

A sharp North/South asymmetry in water resource distribution

The northern shore of the Mediterranean (including Portugal) receives 90% of the basin’s water resources. Water demand there (138 km²) represents 13% of potential conventional resources, against 116% on the south shore (116 km²). In 2010, apart from Lebanon, all countries on the southern shore are already experiencing water shortages (resources less than 1,000 m³/capita).

Water availability (m³/capita)

- < 500
- 500 - 1000
- 1000 - 1500
- 1500 - 2000
- > 2000

2010
Climate, bio-geographical and cultural diversity offer a variety of cultivars, animal breeds and local know-how, all of which support the production of high quality products and foods adapted to local conditions. Mediterranean farmers have shown in the past that they have the ability, both individually and collectively, to manage water resources well. The countries on the northern shore have productive farming systems, abundant and under-utilized water resources, and efficient territorial governance tools for managing irrigation. Numerous Mediterranean countries have for many years developed a long-term strategy for irrigation water management. They benefit from recognized hydro-agricultural expertise and equipped agricultural land. Several countries (Tunisia, Spain, Morocco, etc.) are now well advanced in a transition to more water-efficient drip irrigation techniques.

An active civil society is emerging (cooperatives, associations, etc.), reflecting the enormous development potential of small-holder agriculture and it becomes more professionalized and structured to gain access to markets. The oil-rich countries have financial resources, and renewable energies offer significant possibilities. Demand is growing on domestic and foreign markets for typical Mediterranean products and goods and services from the region, stimulating synergies between agriculture, tourism and crafts, etc. Examples of local governance, public policies and the results of agricultural research demonstrate the possibility of achieving real progress (see boxes).

The Mediterranean region also has resource centres for water and agriculture to support its development efforts: CIHEAM-International Center for Advanced Mediterranean Agronomic Studies, Plan Bleu, Arab Water Council, Mediterranean Water Institute, ICARDA-International Center for Agricultural Research in the Dry Areas, etc. So many assets to develop!

To meet the challenge, solutions exist and the Mediterranean does not lack assets

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### Getting organized locally for sustainable and productive water management

The studies of Elinor Ostrom, the Nobel Prize in Economics in 2009, showed that if all conditions are fulfilled (good communication between directly involved stakeholders and respect of some principles), it is feasible to get organized locally to achieve responsible, productive and innovative water management. Long ago, both northern and southern Mediterranean communities have come up with governance solutions tailored to manage water as a ‘common good’.

**Both in Spain and France**, irrigator communities are currently recognized as public corporations that are legally allowed to pool all owners within an irrigable area, while remaining independent with considerable rights and responsibilities. The Spanish experience confirms the key role played by these corporations in ensuring the equitable use of water, and that of their national federation in communicating the needs of the irrigated area and in defending its interests with respect to the administration.

**In Tunisia**, the strategy for conserving hydraulic system sustainability promotes gradual professionalization and empowerment in agricultural development groups (GDA). Prior to the January 2011 revolution, the public administration and local politicians tended to interfere in the management of associations (manpower selection, board of directors, etc.) and farmers – little involved in what they considered to be administrative ‘vicissitudes’ – poorly complied with the official regulations (operation, maintenance, fees, etc.). The new political environment could now offer farmers and their groups with an opportunity to get better organized and thus to fully play their role. A programme involving pilot initiatives to support irrigation GDAs (PAP-AGIR), funded by AFD* and with the participation of several French and Tunisian researchers, is backing 15 pilot GDA projects to fuel the debate on a new type of potential partnership between farmers and the administration. This programme creates new fields for discussion, thus reducing asymmetries while supporting and supervising innovation and learning processes.

**In Morocco**, due to the catastrophic decline in the Souss Massa groundwater level (caused by uncontrolled expansion of cropping, wells and motor pumps) and their impacts on the regional economy, Souss Massa Drâa regional elected representatives, aware of the risk of catastrophic scenarios, began tackling the problem in 2005. A framework agreement was signed on water resource conservation and development, involving farmers, ministries and the regional agencies for water and agriculture. It aims especially at linking water supply (water transfers) and demand (subsidies for water conservation, drilling control, production trends, etc.). A recent study (December 2012), commissioned by AFD and Plan Bleu, assessed economic instruments that should be fostered in order to meet sustainable and productive water management goals. According to the authors, water fees are ineffective, being an unfair burden on farmers’ income, whereas tradable quotas are a much better solution. These enable water volume control without penalizing farmers and enhance unstrained water resource usage. Sustainable groundwater management will only be possible if police interventions are legitimized through agreements signed by all farmers. Long-term water and food security will require the recognition of rights and collective preservation of water resources by the farmers concerned.

*AFD: Agence Française de Développement (French Development Agency)
An essential paradigm shift

Few developing countries have, however, actually implemented policies aimed at integrating the entire rural community into a modernization strategy, which explains the extent of rural poverty and the clear-cut duality that prevails with respect to land, production systems and territories.

Throughout the sub-region, Syria has been the only southern Mediterranean country that re-became a wheat exporter for a while, with its production increasing from 2.1 million tons in 1991 to 4.5 million tons in 2004 through the use of high quality seeds, supplemental irrigation and efficient support policies. Severe droughts in recent years and the decline in political support have, however, led to major problems, outmigration and massive instability.

Morocco recently took a new direction in its Plan Maroc Vert 2008-2020 agricultural policy. It is based on a pluralistic agricultural vision with a component specifically devoted to small-scale farming, and promoting economic use of water, regional products (“produits de terroirs”), tailored to conditions and creating high added value.

In the developed countries of the North, lack of appropriate policies (resulting in significant food wastage and land and water losses) and lack of regional cooperation are also at issue in the current rise in regional risks.

A new paradigm is needed to come up with solutions. It should take into account the many factors that contribute to food security and sustainable water resource management:

1. **Public policies**: from reactive to proactive policies
2. **Economy**: from a profit and wastage-based economy to a productive, innovative, sparing and efficient economy
3. **Agriculture**: from a standard vision to a diversified, territorialized and sustainable agricultural vision
4. **Small-scale farming in the developing countries of the South**: from subsistence farming to market orientation
5. **High potential production systems**: from conventional agriculture to sustainable intensification
6. **Systems in marginal areas**: from poverty/desertification/land abandonment to ‘terroirs’ that are resilient and able to produce goods and environmental services
7. **Water**: from the maximization of per-hectare yields to the maximization of water productivity (“more income and more crop per drop”)
8. **Land**: from land/soil degradation and urban sprawling to land conservation and rehabilitation for production
9. **Institutions**: from top-down approaches to the empowerment of local communities with innovative mechanisms focused on effective technology transfer, rural information and advisory centres (new extension services), training and supporting farmers and farmers’ groups
10. **Cooperation**: a new priority for rural/territorial development with innovative partnerships/networks

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**Scientific research to support the necessary changes**

**Scientific research** plays a vital role in enhancing knowledge and fostering progress in water productivity and sustainability.

Researchers from different agricultural institutions on both sides of the Mediterranean (including Cirad¹ and IRD² in France) study, for instance, water governance issues in the Nile Delta and North African regions.

**Genetic improvement of plant and animal species**, based on the natural diversity that prevails in the Mediterranean region, enables yield increases under harsh environmental conditions. ICARDA³ thus holds a collection of Mediterranean plants (cereals, legumes, etc.) consisting of over 130,000 specimens. Between 1980 and 2010, the centre disseminated nearly 900 improved cereal, legume and forage plant varieties adapted to different environmental conditions.

**Conservation agriculture and agro-ecological techniques** are also required for sustainable intensification of production systems. According to ICARDA, wheat yield gains can be achieved by enhancing cropping system management, e.g. 45% and 85% increases under irrigated and rainfed agriculture, respectively (documented in Syria and Morocco), while a threefold increase is ultimately possible. In Egypt, production can be increased by 20%, with 25% water savings, by growing crops in raised mounds. In Morocco, INRA⁴ at Settat showed that farmers who had switched to direct seeding without tillage (6,500 ha in 2013) were able to increase crop yields by 30-40%, while obtaining a 60% water efficiency gain, a 70% drop in energy consumption, and 3-14% increase in soil organic matter.

**Technological innovation** can also help increase agricultural water use efficiency. The French Pôle de Compétitivité Eau, with a global scope, has been jointly accredited by three French regions (Languedoc-Roussillon, Midi-Pyrénées and Provence-Alpes-Côte d’Azur). It aims to stimulate innovation by promoting links between research and business. Several projects related to agricultural water and jointly involving private companies and public research laboratories are under development. They are focused on both water supply (developing wastewater reuse subsectors and processes) and demand (agronomic solutions for reducing crop water consumption), while also taking economic aspects into account.

Considerable progress is therefore possible in terms of water productivity (yield/quantity of rainfall or irrigation water), soil conservation, cost reduction (energy, etc.) and production system resilience, thus ensuring sustainability and food security. However, very little effort has been made to integrate innovations into the local development process, which explains the slow progress observed.

The reasons are the lack of adapted support policies, extension-services and training of farmers, farmer leaders and professional organizations (cooperatives and other agricultural groups).

¹Cirad: a French research centre working with developing countries, to tackle international agriculture and development issues

²IRD (Institut de Recherche pour le Développement): a French research organisation which activities contribute to the development of southern countries

³ICARDA: International Center for Agricultural Research in the Dry Areas

⁴INRA (Institut National de la Recherche Agronomique du Maroc): the national agricultural research centre in Morocco
**SESAME initiative for the Mediterranean region**

**Water and food security in the Mediterranean region: towards a shared vision**

The G20 Summit under the French presidency placed food security at the top of the international political agenda. At this Summit, the G20 highlighted the need for a global discussion on water concerns, which are at the heart of questions concerning regional and global security. At the 6th World Water Forum in Marseilles in March 2012, the French High Council for Food, Agriculture and Rural Areas (CGAAER) prepared, in collaboration with many partners including FAO, a report entitled “Water and food security under global change” which highlighted the challenges to be addressed and gave many examples of possible solutions. In this context, and in line with the discussions that took place during the G20 Summit and the World Water Forum, the Seminar on Water and Food Security in the Mediterranean (SESAME), which was held on 21-22 February 2013 in Montpellier (France), focused on the Mediterranean region, with the aims of drawing up a preliminary assessment of the situation, of promoting a shared vision and of sketching out potential avenues to explore for a sustainable future. This seminar was organized as a joint initiative of the French CGAAER and the Moroccan Conseil général du développement agricole (CGDA) in partnership with the French Development Agency (AFD), Agropolis International, Plan Bleu, the Centre International des Hautes Etudes Agronomiques Méditerranéennes (CIHEAM), the NGO Échanges Méditerranéens, the Mediterranean Water Institute (IME), the French Water Partnership (FWP), the Conseil général de l’environnement et du développement durable (CGEDD), with financial support from the Région Languedoc-Roussillon and the Agence de l’Eau Rhône-Méditerranée-Corse.

The SESAME initiative, relying on existing networks, offers a platform for sharing ideas and experiences on water and food security. According to Mohamed Aït-Kadi, Chair of CGDA, “this should be a platform for ideas that draws on the incredible scientific research reservoir of our region to enhance discussions and debates and identify innovative and pragmatic alternative strategies to help meet the challenges facing our region.”

There is a striking gap between the extent of challenges to be addressed and the lack of current responses at all levels (international, Euro-Mediterranean, national, local). Decisions that have been made do not take the complexity and interdependencies or long-term effects into sufficient account and lack a systemic and forward-looking vision. In many countries on both sides of the Mediterranean, top-down approaches are used and the implemented policies are inconsistent and inefficient. As urban centres tend to overlook the fact that they primarily depend on rural areas, there is a marked lack of agricultural policies and considerable wastage (farmland, water, food, etc.). Some catchment areas are impacted by heavy political water resource conflicts, which stand in the way of fair and balanced water resource allocation and food security.

The SESAME initiative aims to bring together Mediterranean experts in different disciplines and policy advisers to forge a shared regional vision on these issues, so as to help in drawing up efficient public policies and concerted actions for the wellbeing of local inhabitants.

Top priorities to enhance sustainability in the Mediterranean region:
1. Placing people and their basic needs, rights and responsibilities at the centre of concerns and debates
2. Creating awareness of the interdependencies (urban/rural, upstream/downstream, water-rich and water-poor countries) and the strategic importance of water and agriculture for food security by assessing the costs of inaction; integrating food security issues into water policies and vice versa
3. Revisiting legal and institutional frameworks to enable participatory territorial governance at relevant levels and more equitable and secure resource allocation, while abandoning standard and top-down strategies
4. Building on a future-oriented modernization strategy that integrates the rural community, especially family farming, which is the primary water management entity; developing training for farmers, farmer leaders and local extension and advisory services
5. Optimizing, in resource-poor countries, three types of water - blue water (irrigation), green water (rainfall) and virtual water (taken here to mean water contained in imported foods)
6. Reducing losses and wastage of food and farmland (and associated agricultural water loss) and reducing water losses and wastage (water demand management, storage)
7. Promoting ecological intensification to increase agricultural water productivity and system resilience (agro-silvo-pastoral, rainfed, irrigated), based on both local know-how, and on research and innovation, whether it be agricultural, technological, social or organizational
8. Thinking about the possible content of a Euro-Mediterranean “New Deal” to meet the challenges—North/South and South/South cooperation, making supplies secure, inter-disciplinary training, creating added value and jobs in rural territories, etc.