




Green Technology for the Agricultural Sector in the Arab Region

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**Green Technology Transfer, Adaptation and Investment Required for Implementing SDG 12:
Sustainable Consumption and Production – Amman, Jordan – 30 and 31 July 2019**

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Definitions

Agriculture is the work and methods of growing crops and looking after animals that are then used for food.

Art of cultivating the soil, growing crops and raising livestock

Green Agriculture uses green technologies that mitigate or reverse the effect of human activity on the environment.

Environmentally-sound
Technologies, climate-smart
technologies

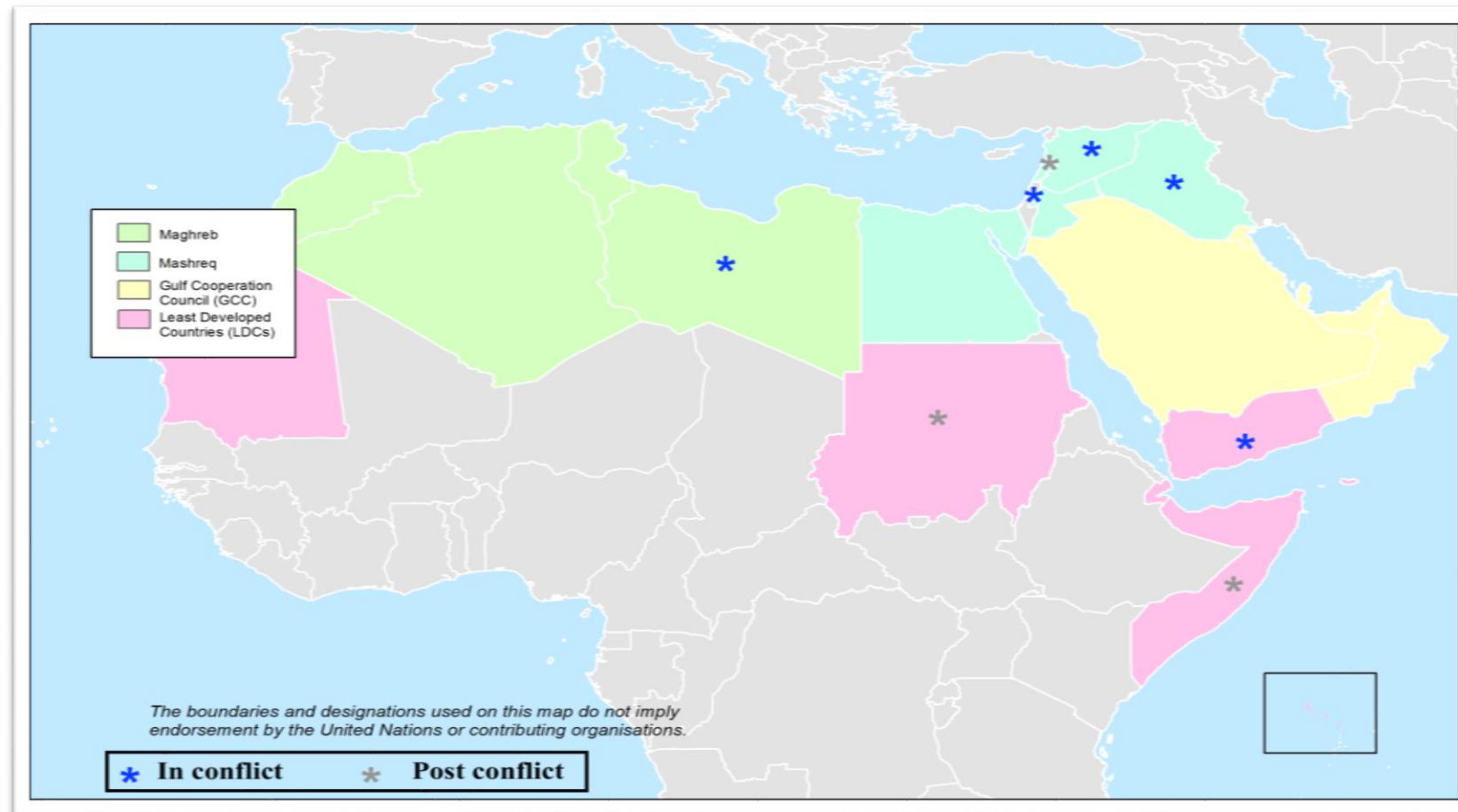
Report Objectives

- Describe the main green agriculture technologies used globally.
- Assess the status of green agriculture in the Arab countries and compare to the rest of the world.
- Address technology transfer mechanisms and opportunities to close the gap between the Arab region and elsewhere.



Focus on the cultivation part of Agriculture

Arab Sub-Regions



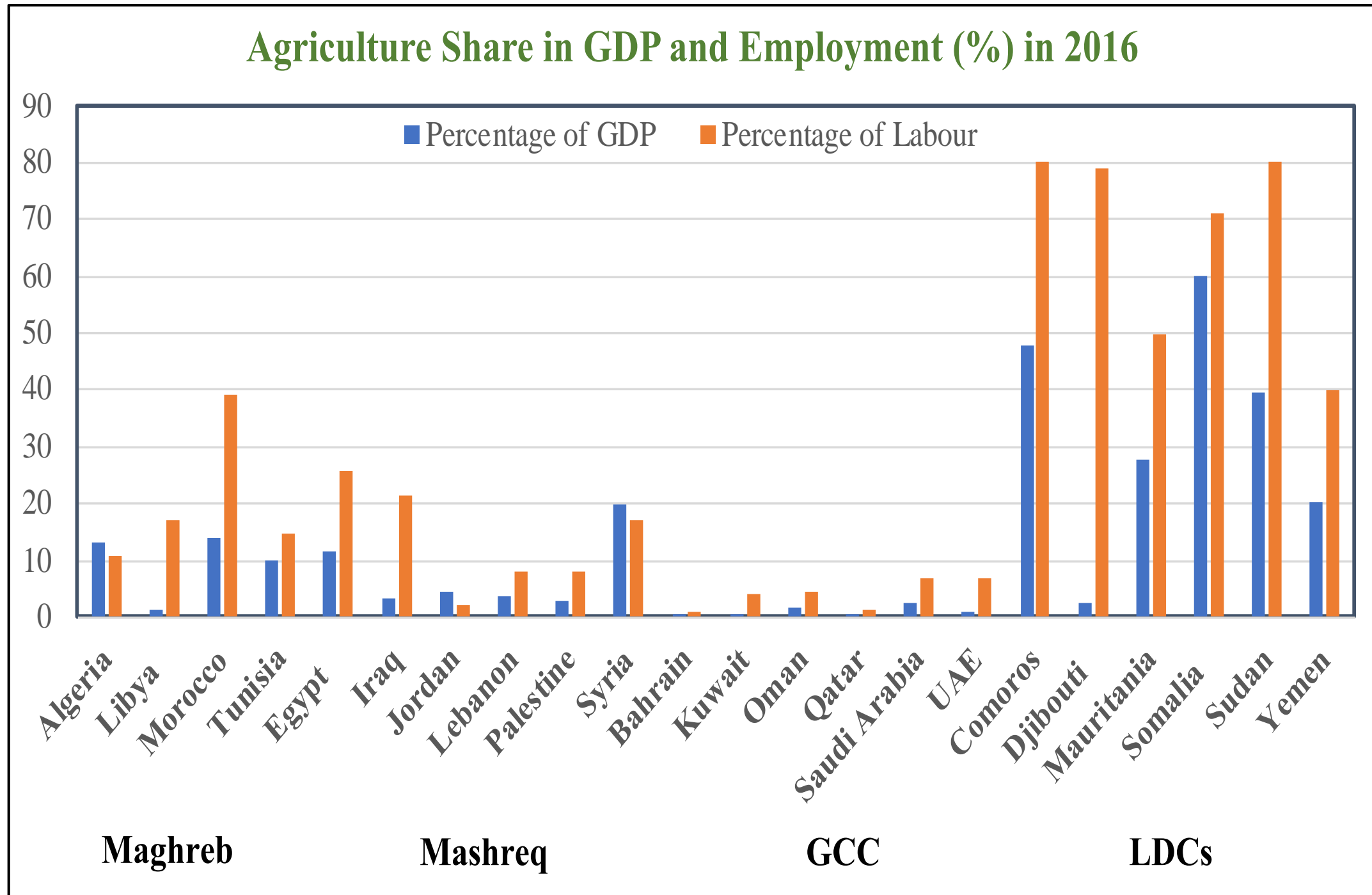
Maghreb: Algeria, Libya, Morocco and Tunisia

Mashreq: Egypt, Iraq, Jordan, Lebanon, Palestine and Syria

Gulf Cooperation Council (GCC): Bahrain, Saudi Arabia, Kuwait, Oman, Qatar and the United Arab Emirates (UAE)

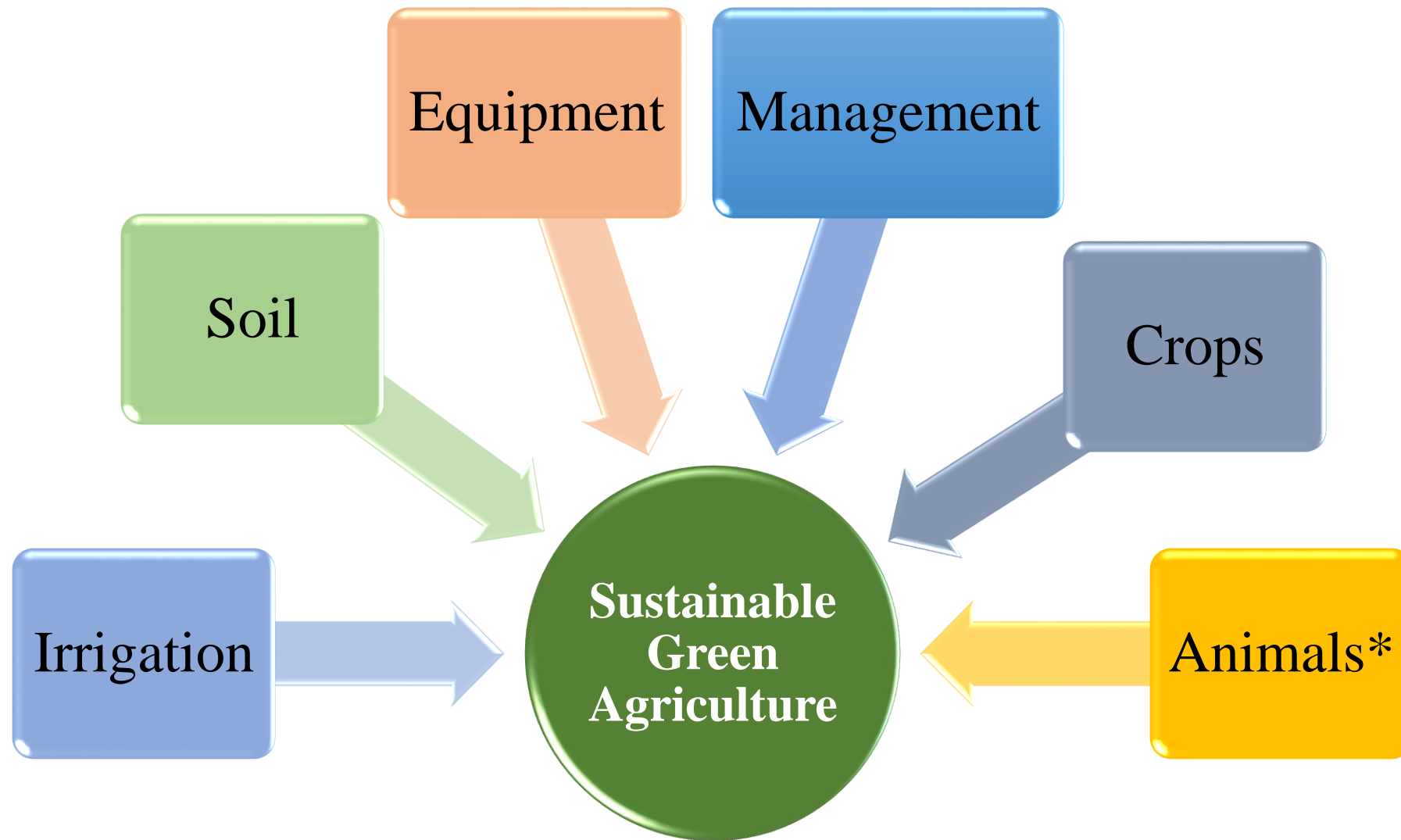
Least Developed Countries (LDCs): Comoros Islands, Djibouti, Mauritania, Somalia, Sudan and Yemen

Context



Over 80% of GCC water used in Agriculture

Agriculture Elements and Processes



* Not included in the scope of the report

Technologies Description (1/2)

Renewable Energy
Provides power and heat



Precision Farming
Uses satellites and sensors for precise crop management



Vertical Farming
No soil, less water

- Hydroponics
- Aeroponics
- Aquaponics



Smart Irrigation
More efficient water use



Improved/Enhanced Seeds
Cross pollination or individual seed treatment



Technologies Description (2/2)

Water Recycling & Reuse Reed Beds

- Direct re-use
- After treatment



Organic Waste Re-use

Composting or
fuel production



Sustainable Soil Management

Improve productivity
Respect environment



Integrated Pest Management (IPM)

Ecosystem-based
strategy



Biofuels

Oily crops for biodiesel
Sugar-rich crops for
bioethanol



Green Agriculture Technologies Status in the Arab region

Sub-region	Support required
Maghreb	Technologies available Need capacity building and financial support
Mashreq	Technologies available Need capacity building and financial support Proper integration with other re-building efforts (many countries in conflict)
GCC	Focus areas selected and funding allocated Can procure technologies with capacity building
LDCs	Most support needed here, from all aspects

Most technologies can be found in the Arab region, at varying levels of:

- **Technology Maturity**
- **Availability** (differs between countries):
 - Feasibility
 - Affordability

	No support required. Either has the technology, skill and funding or can obtain it
	Some support required, especially with capacity building and/or funding
	Major support required for technology, skills and funding

Analysis of Green Technology Availability and Opportunities in the Arab Region (1/2)

Almost all technologies described are available in the Arab region, at different levels

Some technologies are fully commercialised whilst others are still at pilot stage. In some cases, it never went beyond that stage, mostly due to lack of funding

The main factor that helped in making the technologies available is foreign support, via various agencies and NGO's

Having the right economic policies and incentives plays a big role in promoting the use of green technologies, as demonstrated clearly by Lebanon's LWP. Many countries in the region are reviewing their policies in that direction

There are many examples of innovation at a local level. If encouraged, those can make a difference, locally and internationally

In many cases the innovative green technologies-based projects or start-ups were led by young men and women, entrepreneurs or volunteers

Apart from some proprietary technologies, the majority of technologies described are available to use, provided funding and adequate skills are also available. Not expecting any IPR issues

Analysis of Green Technology Availability and Opportunities in the Arab Region (2/2)

Technologies in particular are widely spread and/or have a huge potential:

- *Renewable energy, especially solar PV*
- *Hydroponics and aquaponics*
- *Recycling and reuse of greywater*
- *Soil improvement technologies*

All above technologies are a perfect fit for the Arab region, given the type of climate, water scarcity and solar radiation. They represent great **opportunities for local communities, including the youth and women**

In all cases, economy of scale can drive costs down

Recycling and re-use of farm waste does not fulfil its full potential due to lack of finances, lack of awareness and farmers mobilisation

Naturally, the other technologies also offer job opportunities for Arab youth and women and help address climate change issues. However, most require special skills or considerable upfront investment. Hence, prioritisation becomes very important



Technology Transfer (TT) Mechanisms (1/2)

Local Within the same country Generally facilitated by Industry or government entities and can come in the shape of Public-Private-Partnerships (PPP)		<ul style="list-style-type: none"> - From local research institutions to Industry as in the case of SME incubation programs and University-based IP commercialization units - Spin-offs and start-ups collaboration with existing companies
Regional	Intra- Within the same region Generally facilitated by both parties' governments or by regional organizations	<ul style="list-style-type: none"> - Example: Collaboration between Iraq and UAE in biofuel from rotten dates project - Example agreement: Beirut Declaration
	Inter- Between different regions or countries from different regions Generally facilitated by both parties' governments or by international organizations	<ul style="list-style-type: none"> - Example: Mediterranean countries collaboration projects - Example: UAE collaboration with India on sustainable agriculture technologies
International At international level Generally facilitated by international organizations		<ul style="list-style-type: none"> - Treaties/agreements, e.g. the Paris Agreement and the Addis Ababa Action Agenda - IP institutions, e.g. JIPA's GTTP and WIPO GREEN - Development banks, e.g. the ADB, the Technology Bank for LDCs and EBRD's FINTECC program - Dedicated international organizations, e.g. FAO and WFP - International organizations dedicated to Agriculture R&D, e.g. ICARDA and ICBA. - Some developed countries International Development Agencies/ Departments, e.g. USAID and GIZ

Technology Transfer (TT) Mechanisms (2/2)

For an optimum TT, it is important to **include technical support** and **capacity building**. Procuring just the technology leads to sub-optimal results, at best.

Enforcing IP rights is a critical part of TT and cannot be emphasized enough. To benefit from externally-developed technologies, Arab countries must have **legal systems that can adequately protect patents**.

The TT can be offered in the following formats:

Free of charge: Generally offered to developing countries to help them, through customized development programs.

Collaboration: Via joint programs where both parties contribute in cash or in kind.

Business transaction: Simply via buying a needed technology from the owner.

Overall, adopting a **win-win model**, as much as possible, between the provider and the receiver of the technology can make TT easier.

Technology Transfer Opportunities

Name	Description	Applicability
FEMIP Trust Fund	Part of the European Development Bank, dedicated to offering advisory and capacity building to their Mediterranean Partner Countries	Algeria, Egypt, Jordan, Lebanon, Morocco, Palestine and Tunisia
FINTECC	FINTECC (Finance and Technology Transfer Centre for Climate Change) is part of the EBRD's contribution towards climate technology transfer to countries in transition. It offers investment, policy and technical support	Egypt, Jordan, Lebanon, Morocco and Tunisia
Technology Bank for LDCs	leverage existing initiatives within the UN system and beyond to implement its programme of work and promote Science, Technology and Innovation (STI) in the LDCs.	6 Arab LDCs
GTPP	GTTP (Green Technology Package Program) was launched by JIPA to facilitate IP licensing. Emphasis is put on the “package” aspect as it includes consultancy, technical support and capacity building, as needed. Terms are agreed on a case-by-case basis. Some financial support might be available to help with license fees for those who cannot afford them.	All
WIPO GREEN	Resulted from an agreement between JIPA and WIPO. Described as a marketplace for sustainable technologies, it is an interactive marketplace that promotes innovation and diffusion of green technologies. It does this by connecting technology and service providers with those seeking innovative solutions	All
Development Banks	This is particularly the case for those dedicated to agriculture, such as AAAID ¹⁹² , and The World Bank	Depends on their coverage
UN Programs	The WFP, FAO & IFAD is a great example of such opportunities	All that are eligible
Agriculture R&D Organisations	These are specialized in R&D in the agricultural sector and develop technologies that can be of use, for example: ICARDA ¹⁹³ , AOAD ¹⁹⁴ (Arab Organization for Agricultural Development) and ICBA ¹⁹⁵	Depends on their coverage
Country-Specific Support	SRTF (Syria Recovery Trust Fund) ¹⁹⁶ . Created by many donors to help Syria recover. Offers funding as well as technical support and capacity building in specific sectors	Syria
International Development Agencies / Departments	These are individual countries own international development organizations, such as USAID (USA) and the United Kingdom’s Department for International Development (DFID)	Qualifying countries that need the support
CTCN	Climate Technology Centre and Network, promotes the accelerated transfer of environmentally sound technologies for low carbon and climate resilient development at the request of developing countries	All Arab countries

Technology Transfer Challenges

Financial: Many countries in the Arab region do not have financial resources to pay for the clean technologies. They need either full funding or access to finance with suitable terms.

Legal: Mainly the lack of a legal framework to protect IP in the case of patented technologies. This should be treated as a priority by all countries looking to tap into the latest innovations.

Information and Application: There is not enough awareness by many countries of available TT and capacity building opportunities, in addition to the poor quality of proposals submitted.

Lack of skills and know-how: In many Arab countries, the majority of people involved in agriculture are still using old methods that are, not only harmful to the health and environment but is also very inefficient and produces low yields. To increase skill and know-how levels, cooperation either South-South or North-South is required. This can be done via the large number of initiatives offered by the organizations mentioned in this report. One critical type of this cooperation should be that taking part within the Arab region itself.

Conclusions

Agriculture is a vital sector for most of the Arab countries, for different reasons.

The main technologies found across the region are use of solar energy, hydroponic/aquaponic farming as well as recycling and reuse of greywater.

There are very promising opportunities for the Private Sector to be involved in all Arab countries.

The gap between the Arab region and the developed countries in terms of availability of green technology for agriculture is not large.

Overall, lack of technology use is due to lack of funding and/or skills as well as lack of appropriate regulations to impose and/or incentivise the use of clean technologies.

Many Arab countries are in a conflict situation, which has devastated their agricultural sector and is hampering the efforts required to restore it and develop it sustainably.

The Arab region includes 6 countries classified as LDCs that require special assistance.

The limited intra-regional collaboration is a missed opportunity that could help all parties, for example, by creating an economy of scale and bringing costs down.

The opportunities for TT are numerous from various sources, and most of them available to the Arab countries in one form or another.

The challenges that could hamper TT are all solvable, there are no show stoppers, provided the will is there.

Recommendations

Arab Countries

- Develop the right regulatory environment that incentivises the use of clean technologies in agriculture.
- Encourage the private sector through incentives, less red tape, finance access and Public-Private Partnership (PPP) opportunities.
- Encourage collaboration between Arab companies and governments to increase the scope for economic benefit and to lower the cost through economy of scale.

Organizations

(e.g. ESCWA, LAS, CTCN)

- Facilitate intra-regional networking and knowledge exchange via targeted events.
- Create and keep up-to-date a list of relevant technology transfer opportunities and providers and facilitate South-South and North-South collaborations.
- Compile and disseminate lessons learnt from across the region, especially in Arabic to maximize benefit coverage.
- Support learning and teaching of proposals writing.

ETC

- Champion research into:
 - Combining the use of solar energy with hydroponics/aquaponics.
 - Cost effective grey water recycling and reuse.
 - Soil improvement technologies.