International Water Management Institute

Food and Agriculture Organization of the United Nations

The use of Information and Communication Technologies (ICT) in Water and Agriculture in Lebanon

'Stakeholders Mapping and Needs Assessment' Study

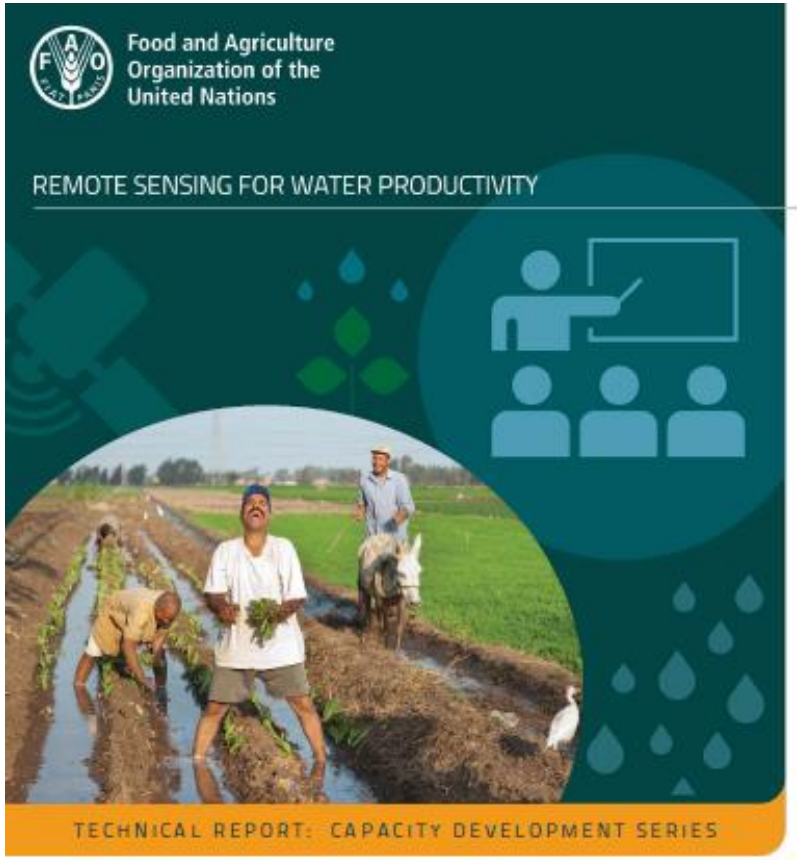
Main findings

Marie-Helene Nassif
Researcher
IWMI MENA consultant

2018

- Phase 1: *Stakeholder mapping and needs assessment for the use of ICT tools*

- Phase 2: *Design of a specific ICT solution*



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Objectives of the study

- Identify who is using ICT tools in Water Management and Agriculture (*Public institutions, Private Sector, NGOs and users*)
- Analyze the constraints and the needs (*funding, policy, know-how, usefulness, governance aspects*)
- Draw policy lessons and recommendations for public institutions, NGOs and private sector
- Identify a specific technological solution to develop in the next phase of the project
- Identify specific capacity building material

Methodology

- Literature review (available reports…)
- Two main surveys (face to face interviews)

12 different national organizations
(public institutions; Private sector; NGOs)

40 farmers in 3 different irrigation systems of the Bekaa valley
(representing different farm size, crops, land and water use)

Survey with organizations

Public **Academia** **Private** **NGOs**

- **Ministry of Agriculture** (Rural Development Department)
- **Lebanese Agricultural Research Institute** (Water and Climate Unit in Fanar; Irrigation and Agrometerology Department in Tel-Amara)
- **Litani River Authority** (Rural Development Center in Kherbet Kanafar, Bekaa)
- **Conseil National de la Recherche Scientifique** (Remote Sensing Center)
- **Beirut Arab University** (Research Center for Environment and Development-Taanayel)
- **Alfa Telecom company** (IOT department)
- **Agrytech** (Start-up company)
- **Arc en ciel** (Programme Agriculture)
- **Lebanese Reforestation Initiative** (GIS department)

Main results

Public admin

NGOs

Research and Uni

Private Sector

- ✓ Several initiatives and many ideas
- ✓ Available expertise (GIS and remote sensing)
- ✓ Donors interested to invest
- ✓ identified cooperation between research, NGOs and public administrations
- ✓ Private sector Interested to learn, invest and fund pilot projects

X Low long term buy in by public administrations and farmers

X Public administrations understaffed and underfunded

X Poor communication flow inter and intra-public administrations

X Solutions too sophisticated and not adapted to real needs

X Telecom companies far from field

X High cost of internet

Examples

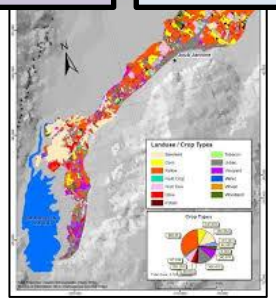
1-Identifying wheat farmers

CNRS **Ministry of Economy**

Monitoring wheat fields through satellite imageries to allocate subsidies to farmers and reduce losses

2- Crop Classification

LRA **USAID proj**



Water Balance for Upper Litani River Basin

3- Forest Mapping

LRI **Ministry of Agriculture**

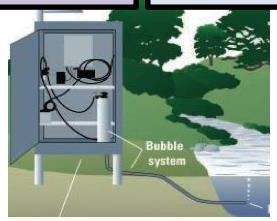
Municipalities

Land use management and reforestation

Examples

Water monitoring devices

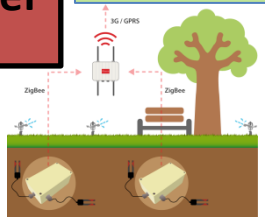
LRA **Different projects**



*Many sophisticated surface and groundwater monitoring **devices were not maintained***

Smart Irrigation System

Arc en ciel **Taanayel farm**



*Improved water productivity but **not affordable and too complex to be practical***

LARI LAB

LARI

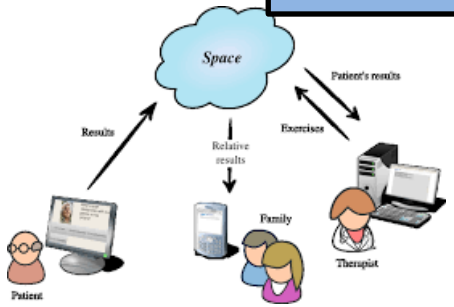
*Limited use by farmers because **weather data is not geo-specific and not translated into irrigation requirements***

Examples

Data sharing system

MoA

FAO



Left unused *because of problems of coordination*

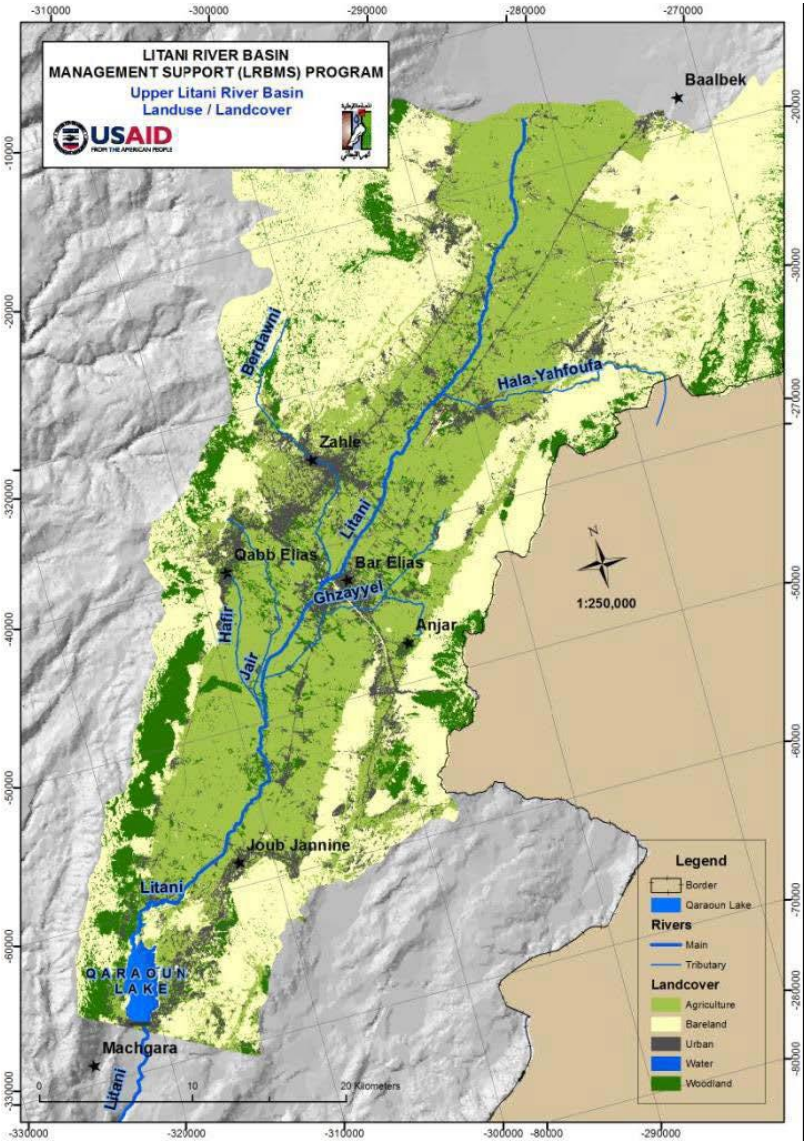
Digital Tensiometers

USAID proj

Farmers of Canal 900

Traditional knowledge was still preferred- ***Farmers did not find it beneficial***

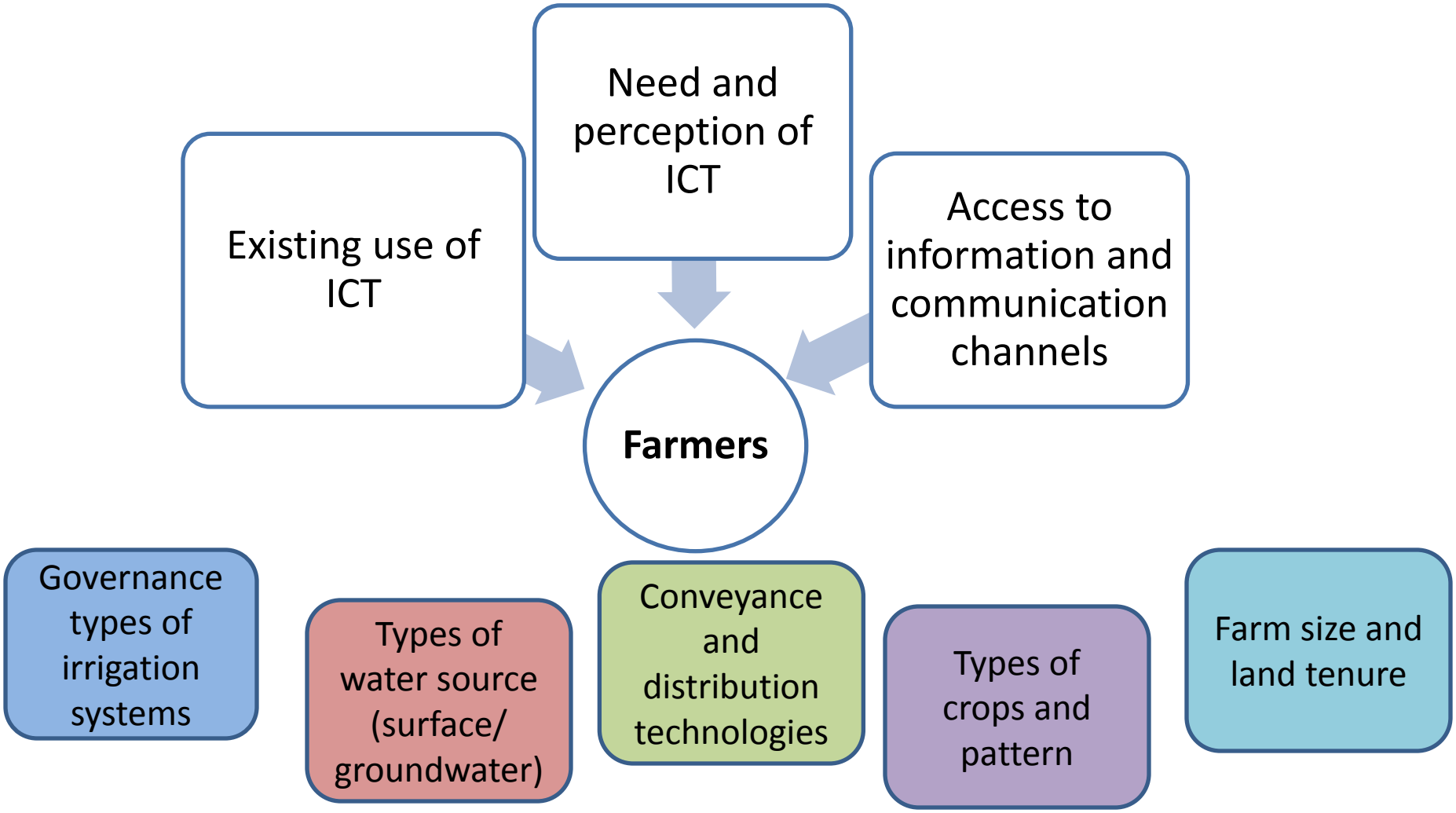
Survey with farmers of the Bekaa plain



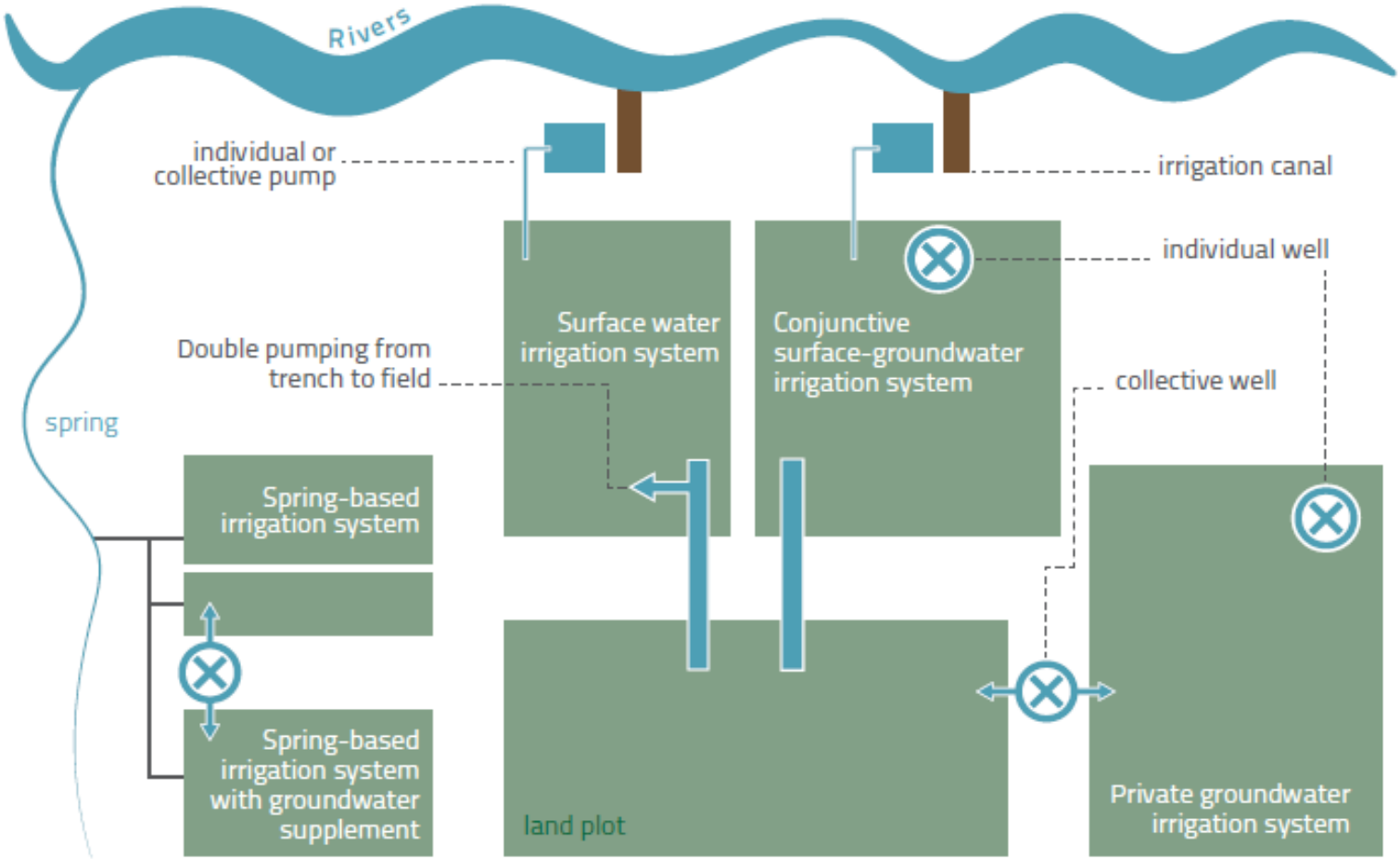
Largest agricultural plain in the country, located in the Upper Litani River Basin

Big pressure on water resources:
springs and rivers dry out in the summer;
Aquifers are depleting

Survey with farmers



Main goal: capture the diversity of irrigation systems in the Bekaa to target who needs to reduce water consumption and has the incentives to do so



Technology used

Reliability of access to water

Cost of access to water

Groundwater governance study IWMI, 2016

Methodology

State managed (LRA)

Community managed

Private (individual or collective)

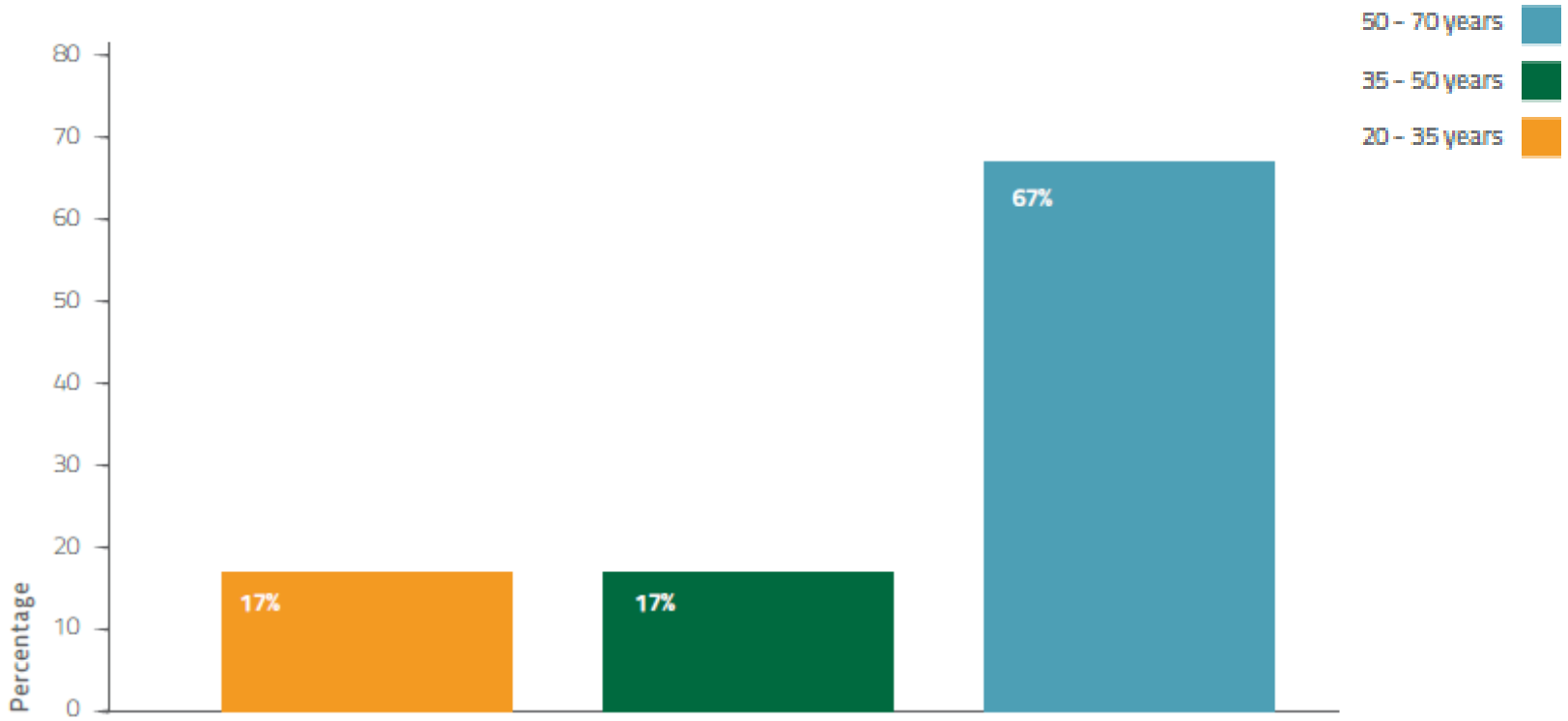
Canal 900 (south Bekaa) Stopped since 2015	**Anjar Irrigation System (central Bekaa)**	**Private pumping**
• Pressurized network • Flat price (per dum)	• Gravity/open channels • Flat price (per dum)	• Pressurized • Incremental price (energy related)
❖ Large plots ❖ Field crops (wheat, potato, vegetables)	❖ Small plots ❖ Fruit trees and vegetables	❖ Different size of plots and types of crops

Main results

Anjar, 2018

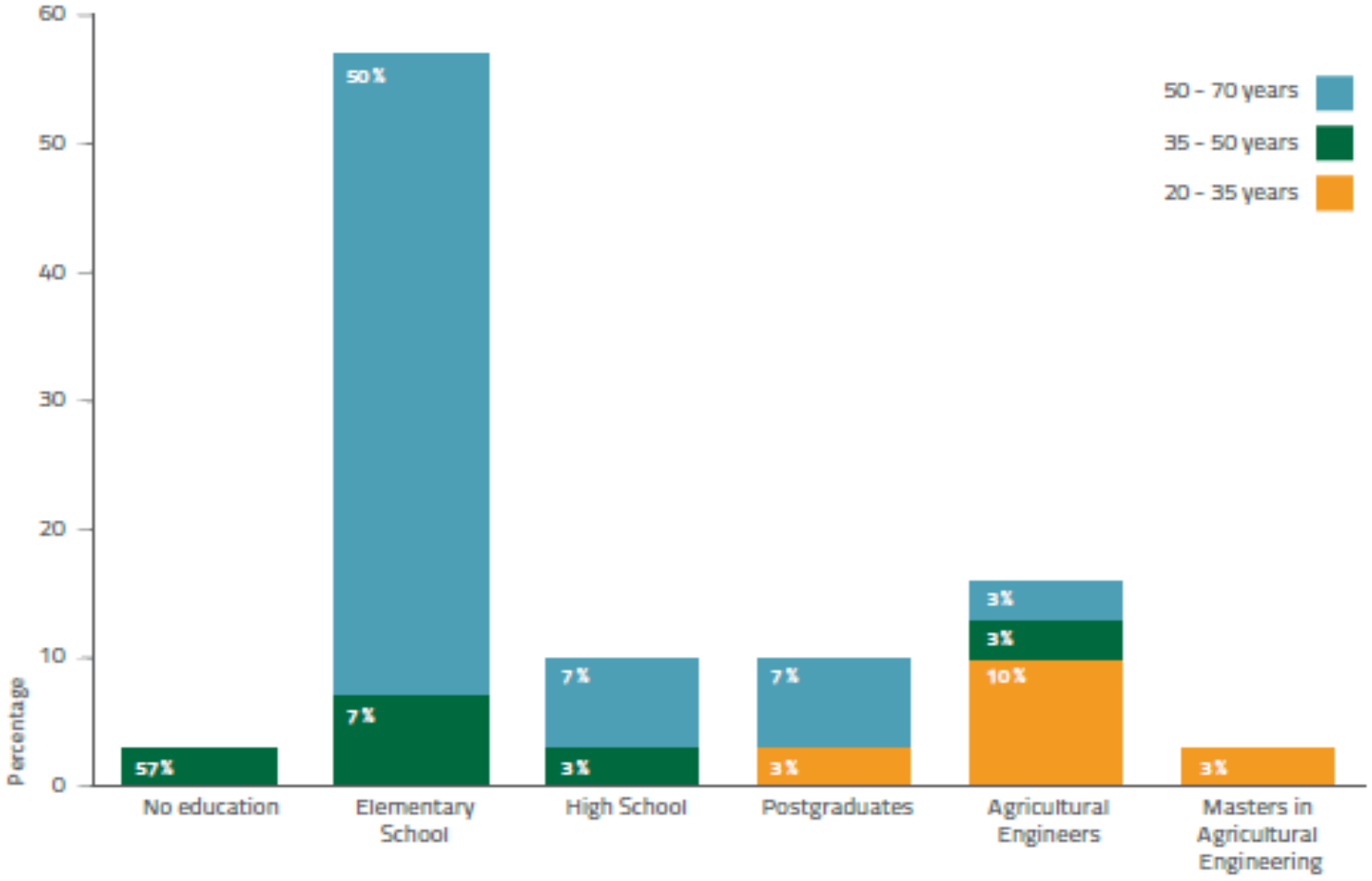
Age and education:
Around 65% of farmers are more than 50 but there is also a new generation of farmers

Figure 9. Age of farmers



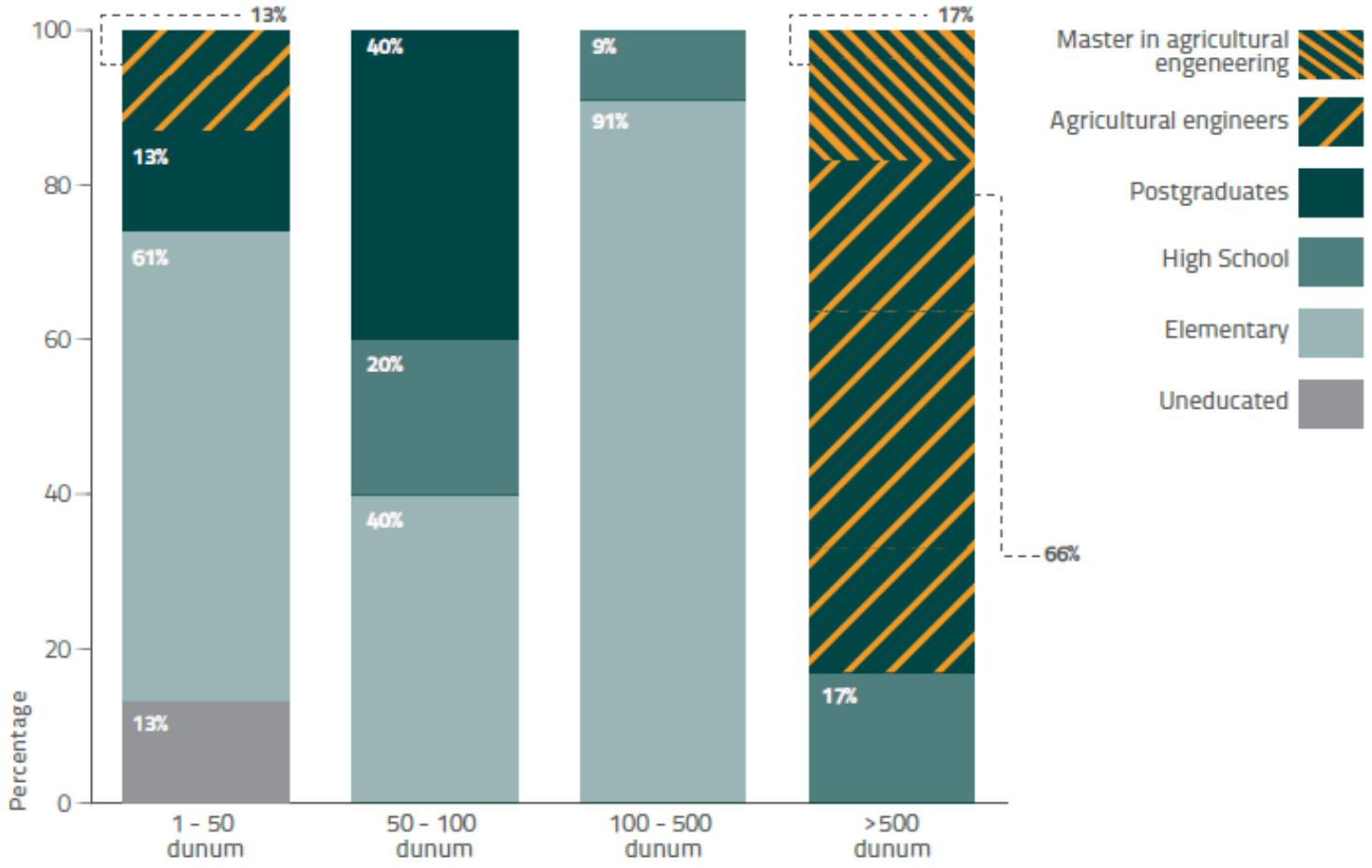
Age and education:
Most farmers above 50 have a basic education and there are several agricultural engineers in the new generation

Figure 11. Distribution of farmers' age according to their education level



Most of the agricultural engineers are managers of the large farms irrigated by groundwater (mostly employed)

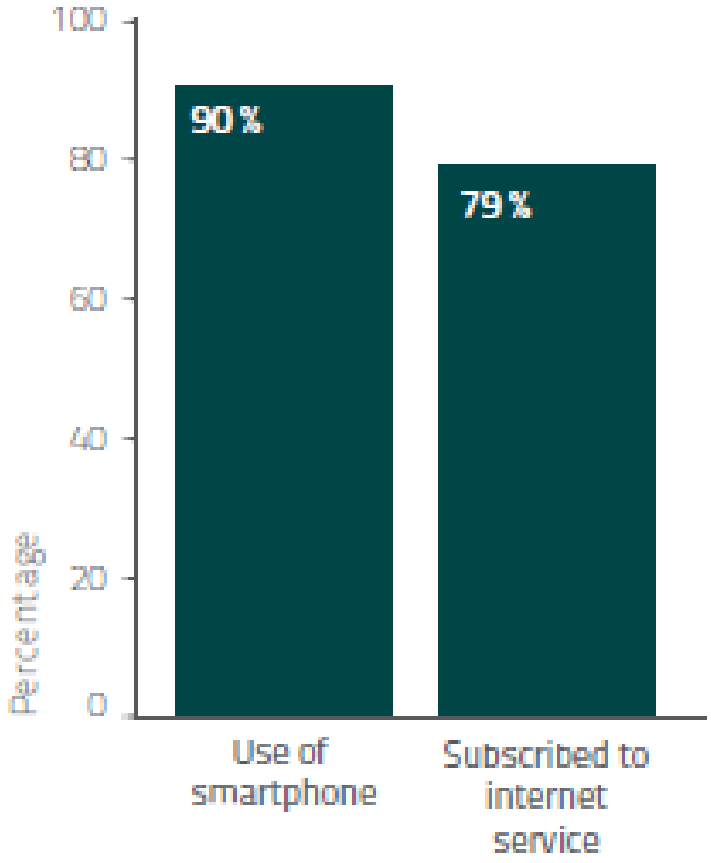
Figure 12. Relation between farm size and farmer's education



Access to internet and technologies:

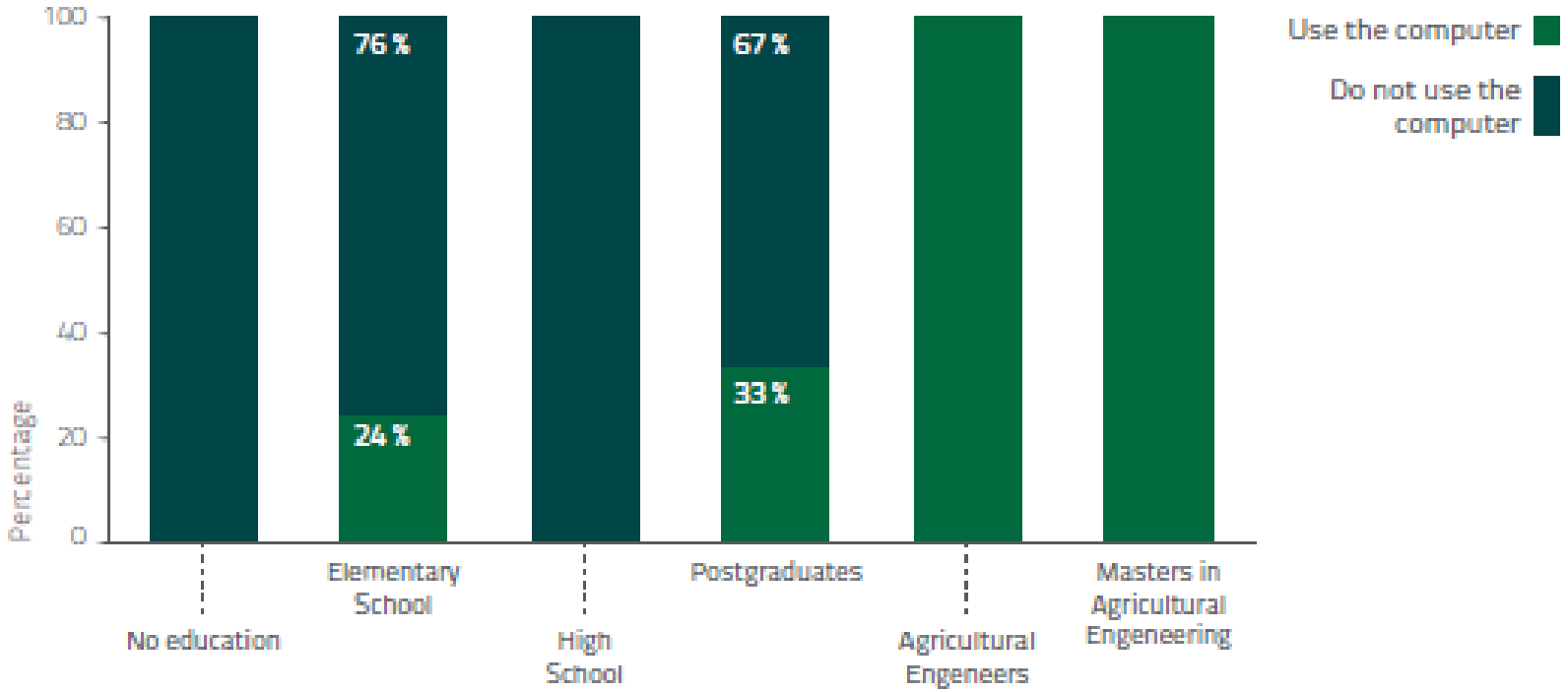
Most farmers have mobile phone and are subscribed to internet irrespective of their age and education level

Figure 29. Use of smartphones and subscription to internet services



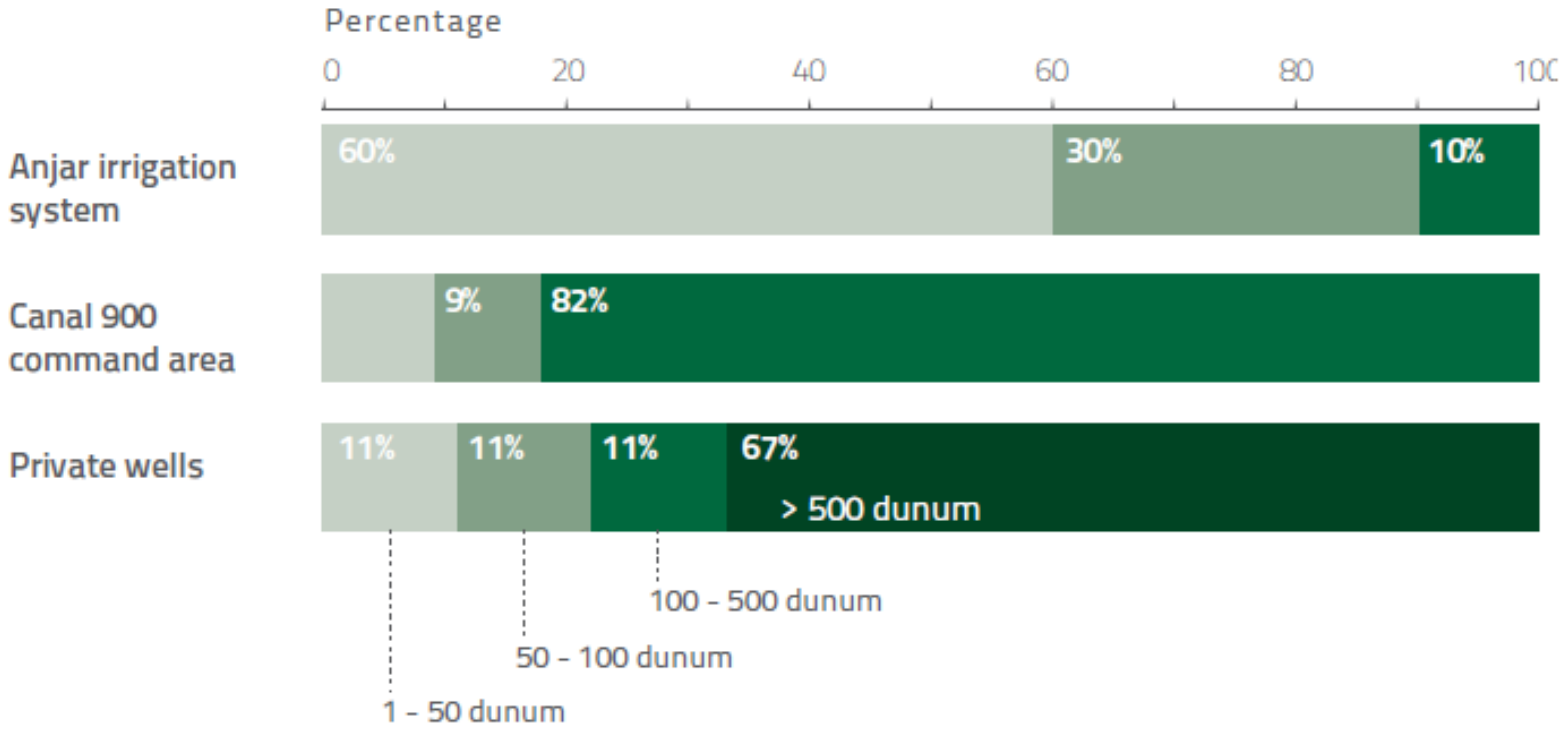
30% of farmers use a computer, mostly post-graduates

Figure 28. Use of computer according to education level

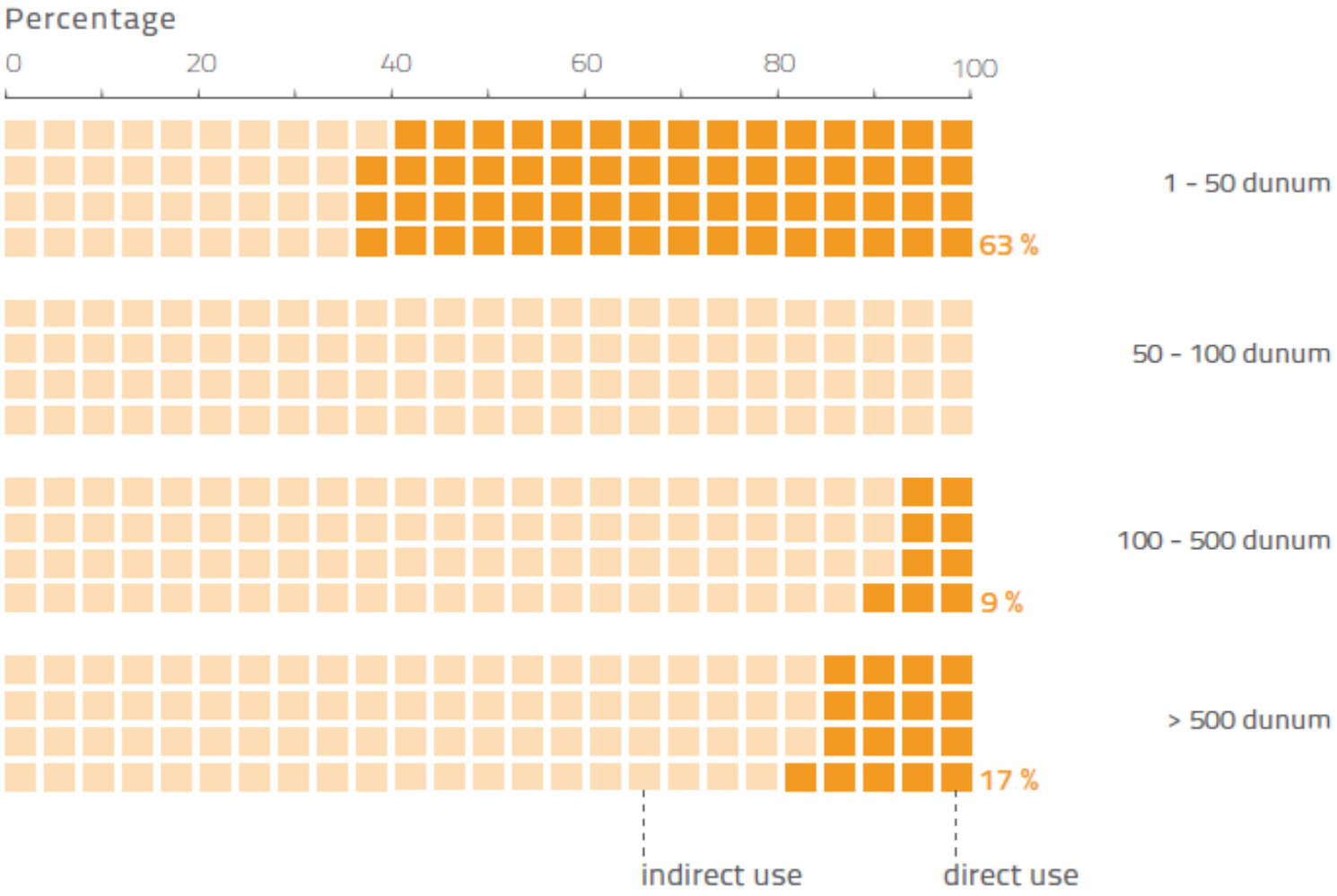


Farm size and water management:
the largest farms are irrigated from groundwater (private wells)

Figure 14. Distribution of farm size categories in the different irrigation systems



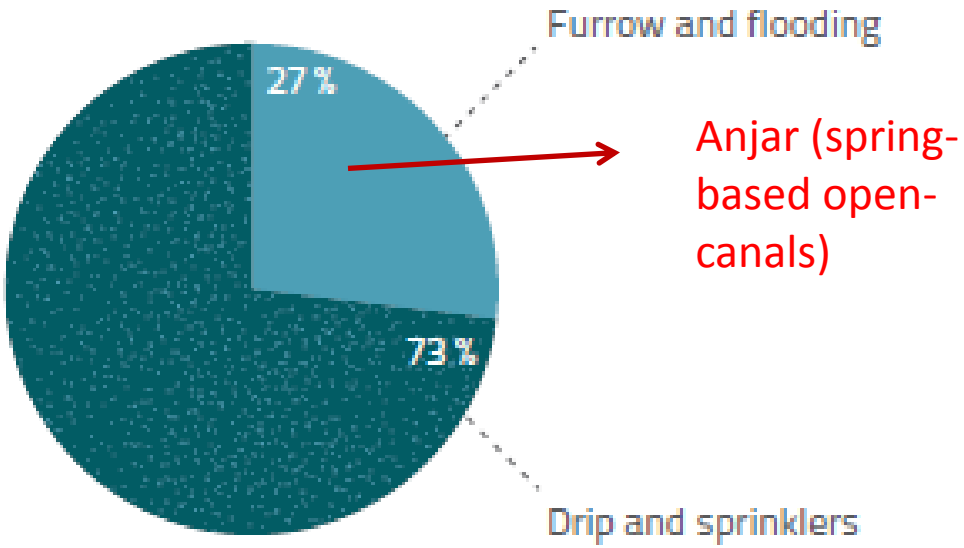
Farm size and land tenure:
Largest farms are under indirect use



On-farm irrigation techniques:

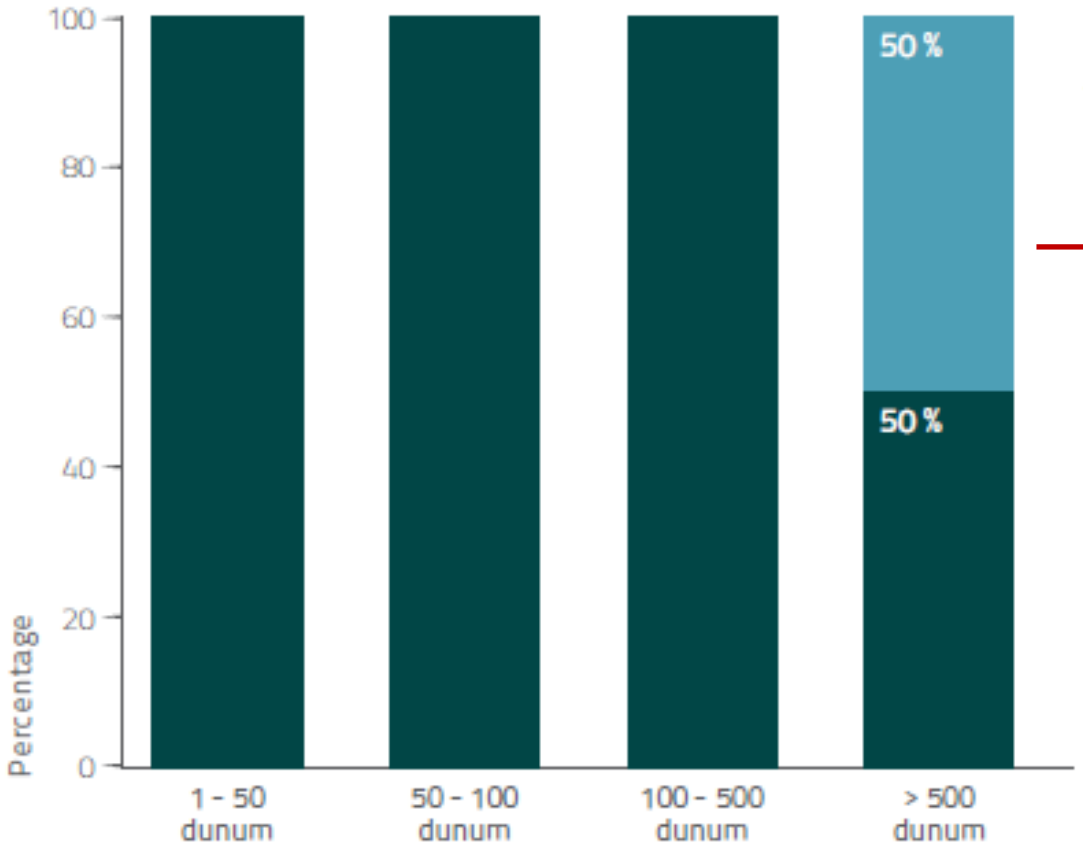
Less than 30% of farmers irrigate by gravity, others used pressurized systems

Figure 21. Irrigation techniques in the interviewed sample



Use of scientific calculations:
found in the case of very large farms using groundwater because of drop in water level and high energy costs

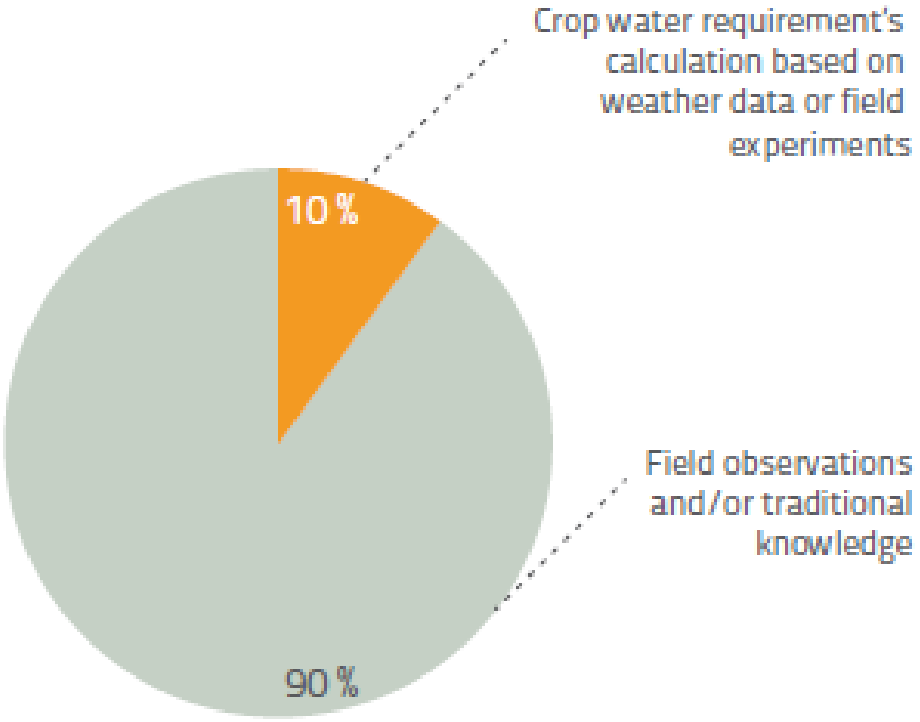
Figure 24. Irrigation decisions according to farm size



1 Large famous winery and 1 large farm exporting iceberg lettuce

Decision-making for on-farm irrigation:
Most farmers rely on field and weather observations and traditional knowledge to decide when and how much to irrigate

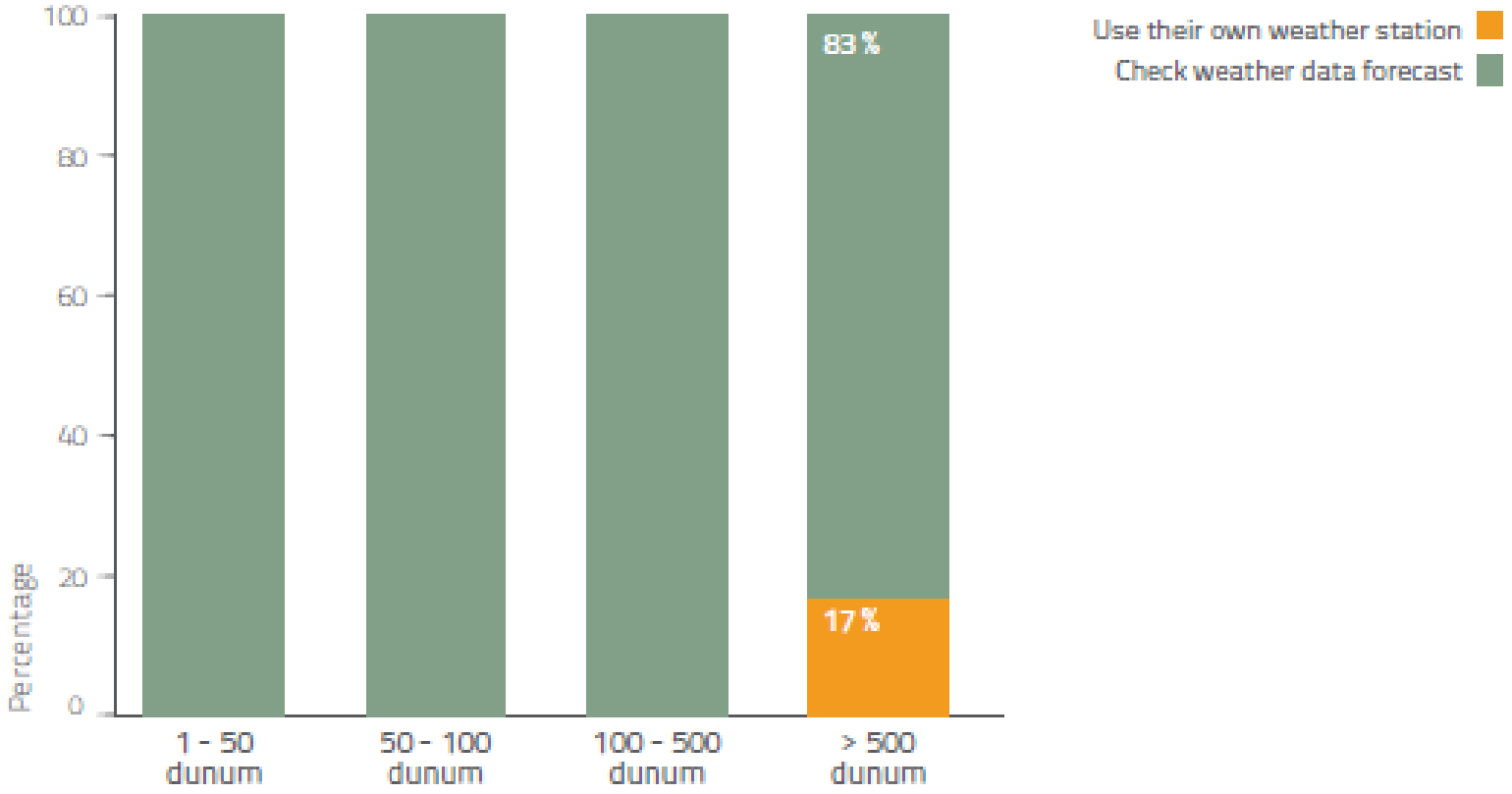
Figure 22. Decision making methods used for on-farm irrigation



Reliance on weather data:

Weather forecast are important to farmers to plan different farming practices

Figure 27. Use of weather data



Use of LARI APP:
used to check general news

Weather forecast is not geo-specific

Problems and needs for information:

Water shortage was mentioned as an obstacle by 50% of the farmers but only 20% need information on on-farm irrigation practices and crop water needs

Figure 35. Problems in agriculture

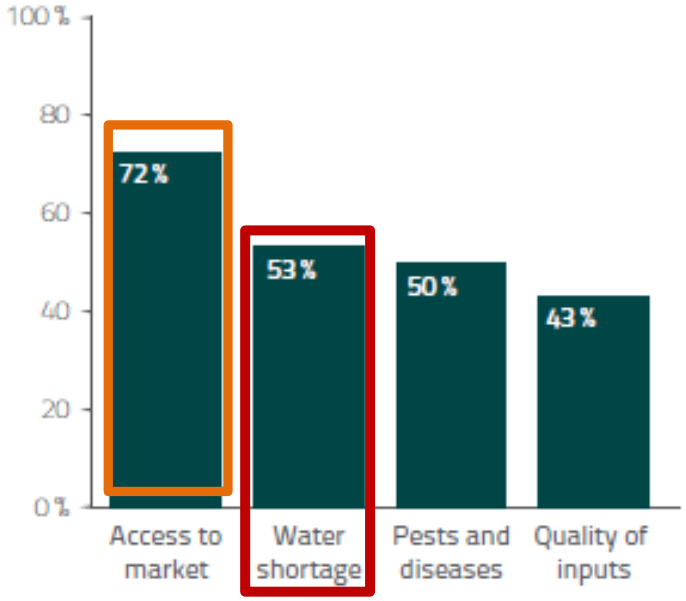
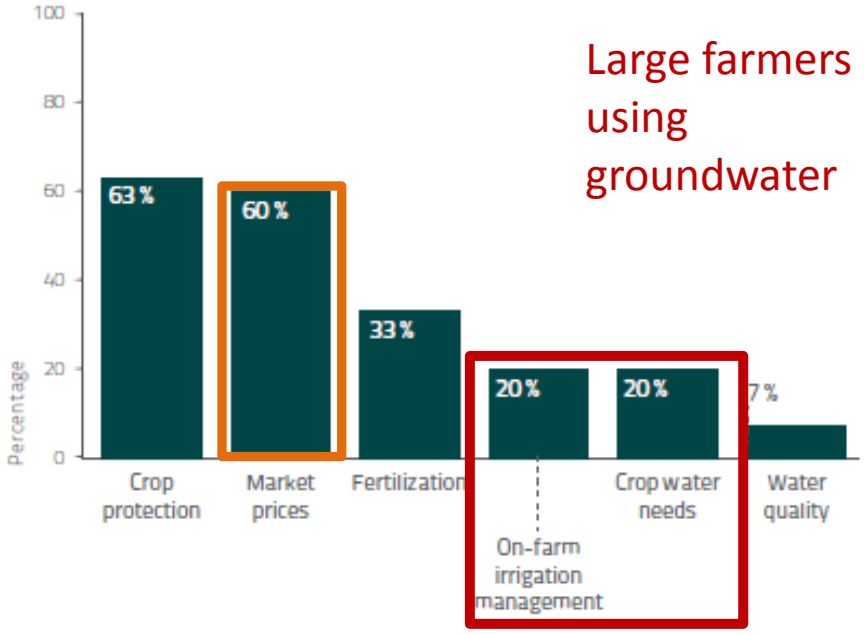


Figure 34. Types of Information needed by farmers



Large farmers using groundwater

Access to extension services:
Limited to collective irrigation systems targeted by projects

Figure 31. Access to extension services

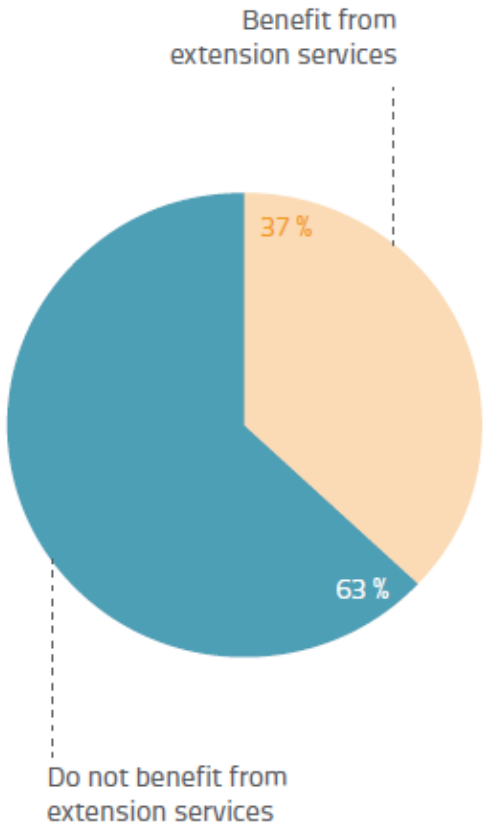
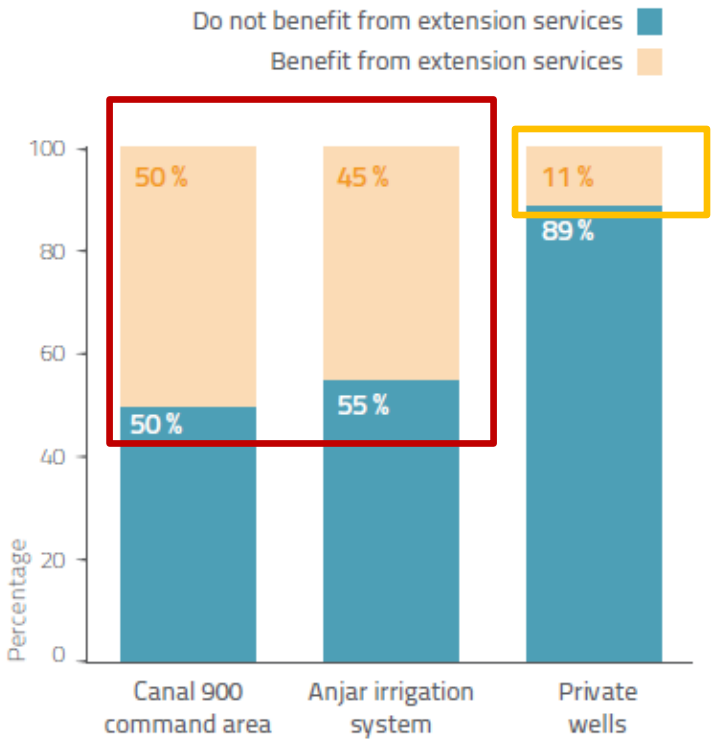
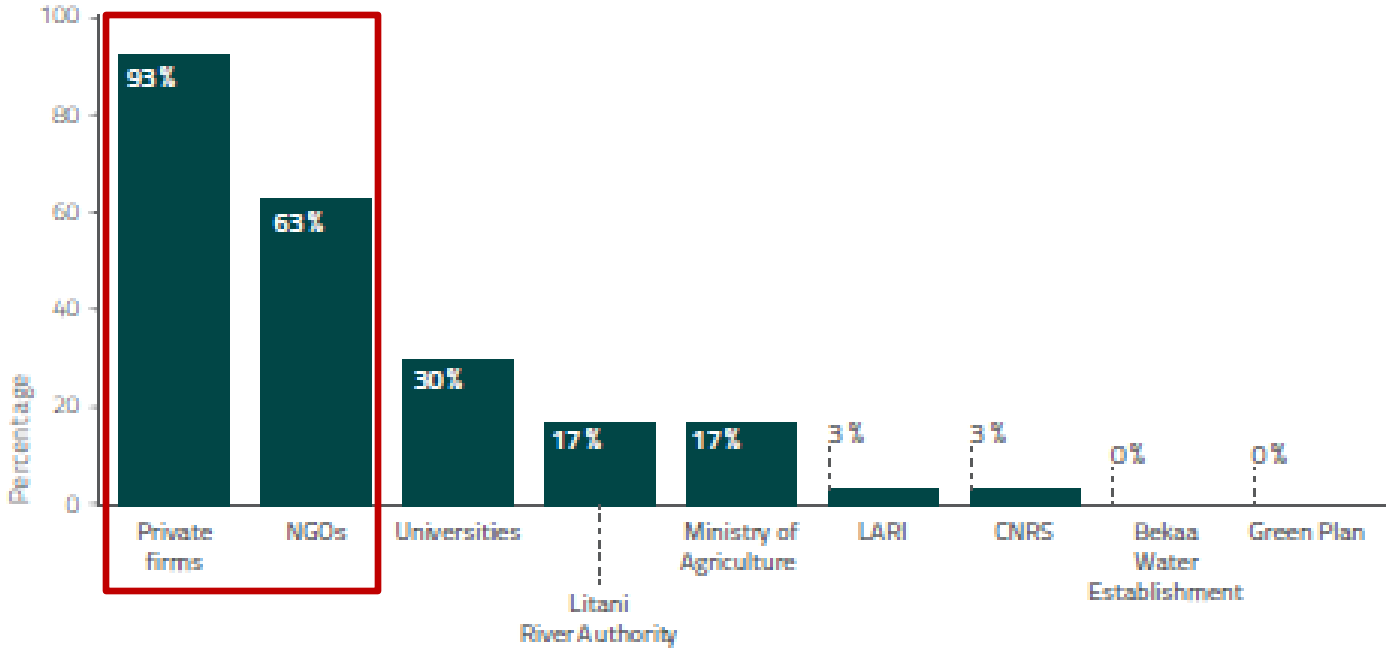


Figure 32. Access to extension services for the three irrigation systems



Private firms and NGOs provide most of technical assistance

Figure 33. Access to extension services from the different stakeholders



Conclusions and recommendations

Global River Basin Planning and water allocation choices

ICT use in agriculture and water management is limited at the level of the Bekaa farmers but large farms are interested to invest to save cost and combat drought risks

Governmental institutions , NGOs and Private sector are taking initiatives but projects should be based on a better understanding of the diversity of water sources, water users , their incentives to make a change in their practices.

Introduction of ICT tools in water management will be most likely to be adopted by large farms using groundwater, and this will have collective impacts if pressure on aquifers is reduced

Small and medium farmers have low incentives to use complex ICT tools. Simple solutions should be designed to help them adjust their water management decisions and they should be given incentives

Since all farmers use smartphones and internet, it was decided to **upgrade LARI APP** in a way to deliver geo-specific irrigation advices to farmers. The objective is for it to be both useful for small and large farmers.

Strengthen public institutions and interinstitutional coordination

THANK YOU