Context-based Technologies to Enhance the Efficiency and Resilience of Agri-food Systems in Lebanon

The role of the agriculture faculties in directing their research and programs to promote technology development in the agriculture sector

August 26, 2019
American University of Beirut
Regional Challenge of Today’s Water Allocation Model and Interconnected Primary Resources

Population 598 million by 2050

Challenges
• Inequity & variability in distribution
• Non-sustainable consumption
• Extremes and non-stationarity
• Non-sustainable business model

Climate Change Impact- Situational Analysis
• River flow reduction impacts water supply and hydropower generation;
• Rainfall and Stream flow reduction impacts soil moisture availability and food production and increased irrigation demand

Opportunities
• New Values – Based Business Model
• Resilient/Sustainable Communities

how can we improve health and livelihood of people and small land owners to be sustainable: economically, socially and environmentally?

The challenge is in developing **systems-based solutions** and **technologies** including:

1. **Design** of in-country novel technologies to produce and process: artificial lighting, hydroponic, vertical farms, organic products, etc..

2. **Facilitate** capital to invest in precision technologies

3. **Help** open local and international markets

4. **Design** multipurpose landscapes for human and ecosystem health

5. **Develop** culture specific solutions to tackle the burden of diet related diseases in the region

6. **Improve** food safety and reduce food losses and waste across the value chain

This is a challenge FAFS can rise up to.
The PLAN

FAFS 2025
**FAFS Strategic Goals**

**Goal 1**
Integrate research in support of water, energy and food security, resilient environments and health and nutrition

**Goal 2**
Deliver outstanding student experience

**Goal 3**
Improve student enrollment relevant to local and regional needs

**Goal 4**
Establish a regional multidisciplinary research, education and community service hub for Water and Food Security at AREC

**Goal 5**
Effectively engage with FAFS stakeholders and communities at large in Lebanon and the region

**Goal 6**
Advance faculty and staff wellbeing
Strategic Initiatives
Newly Launched Strategic Initiatives (Water – Energy – Food – Health Nexus)

**Goals:**

1. Understand complexities
2. Reduce interdependencies
3. Increase resilience
4. Promote ecosystems and human health and well-being
### WEFRAH Funded Research Clusters (2019-21)

1. **Smart Farming**  
   Machine Learning approaches to reduce water and energy consumption in field irrigation  
   Artificial Intelligence (AI) powered arable farming service

2. **Renewable Energy**  
   for Climate Control towards Sustainable Poultry Production

3. **The Fate of Antibiotics**  
   in Soil and their Uptake by Vegetable Crops: Study on Production Quality, Soil Microbiology, and Antibiotics Removal using Advanced Oxidation

4. **The Sheep from the Future**  
   Steps to a new coupling of pastoralism, ecosystems and consumers in an age of environmental degradation

5. **Improving Water and Energy Use**  
   and Recycling Food Waste for better production of Healthy Food

6. **A Food System-Based Prototype**  
   for Healthy, Sustainable and Safe Diets (HeSSaD): The case of school-aged children in the Beqaa Valley, Lebanon

7. **Reduce, Recover, Recycle (3Rs)**  
   Food Waste Management Initiative

8. **Integrating the WEFRAH Nexus**  
   into Humanitarian Engineering: Capacity Building and Field Deployment
AREC: Innovation and Engagement Center for Water-Energy-Food-Health (WEFH) Sciences in Lebanon and MENA Region

Strategic initiative: Goal 4 (AREC as a hub for water and food security)
Strategic Initiative: Goal 1 (Integrate research in support of WEFH)

AREC Tomorrow
A team of AUB professors (FAFS, MSFEA and FAS) awarded a highly competitive $1,000,000 Google's AI Impact Challenge grant for their project proposal in the field of applying AI to improve irrigation water management.
Outstanding Student Experience

Diverse Student Experience

Service Learning (GDT)

Executive Learning

Student Led Activities

Active Learning

Online Learning

Internships and Capstones

Study Abroad

Undergraduate Research

Strategic Initiative: Goal 2 (Deliver outstanding student experience)
Strategic Initiative: Goal 2 (Deliver outstanding student experience)

Transforming Higher Education Project

Transformative Educational Model Components

Key Elements of Success

- Experiential/Participatory Learning
- Community Engagement
- Dialogue & Conflict Resolution
- Ethical & Value Based Leadership
- Social Entrepreneurship and Business Development

AUB’s Commitment:
1. Capstone Experience(s)
2. General Education Course
3. AREC as a hub for student participatory learning across AUB
Orientation Workshop at EARTH University – Launch of Activities for Transforming Higher Education Project

Main Outcomes
1. Learning about EARTH’s Educational Model
2. Commitment to participation in the project
3. Commitment to Key Elements of Success
4. Plan for Change Agenda

Participants

Pilot Universities:
1. AUB (Lead Institution)
2. University of Quisqueya, Haiti
3. Technological Institute of Conkal, Mexico
4. Technological Institute of Higher Education of Calkini, Mexico

GCHERA Members and Other Institutions
1. Zamorano Pan-American Agricultural School, Honduras
2. Purdue University, USA
3. Iowa State University, USA
4. UniLaSalle University – Beauvais, France
5. Australia National University, Australia
6. RUFORUM, Uganda
7. Ashesi University, Ghana
8. Wageningen University, The Netherlands
9. University of Costa Rica, Costa Rica
10. University of Commercial Sciences, Nicaragua
Strategic initiative: Goal 5 (Effectively engage with FAFS stakeholders)

FAFS Engagement Strategy

1. Infuse the culture and practice of engagement among FAFS faculty, students, and staff

2. Promote faculty engagement in community service research and outreach

3. Serve the most disadvantaged communities through research and development

4. Educate students to become positive agents of change in their communities and its development
Objective: To make AREC the **go-to place** for all issues related to **sustainable agriculture, nutrition, health education, natural resources, and landscapes associated with emergencies and crises.**
Enabling Partnerships
Influence the Food, Agriculture and Environment Sectors through Partnerships

<table>
<thead>
<tr>
<th>National Stakeholders</th>
<th>Academic Institutions</th>
<th>Public Institutions</th>
<th>Industry</th>
<th>NGO &amp; Partnerships</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coordination and Promotion of Discipline</td>
<td>Policy Advice and Advocacy</td>
<td>Financing &amp; Entrepreneurship</td>
<td>- Align research agenda and promote sector and Financing - Partnerships to Enhance Student Learning and research Experiences</td>
</tr>
</tbody>
</table>

| Regional and International Partners |  |
|------------------------------------|  |

Enabling Partnerships

[Image of logos and organizations related to the academic, public, industry, and NGO sectors]
Initiative: Mashreq Digital Transformation of the Agricultural Sector

- FAFS collaborating with World Bank Group, UN-ESCWA, FAO, CMI
- Knowledge-sharing process between Iraq, Jordan, Lebanon
- Objectives:
  - Revitalize agricultural sector
  - Boost digital agriculture innovation
  - Raise profile of agriculture among non-agricultural sectors
- Outputs include background paper and ministerial-level event
Proposed IT Initiatives in support of FAFS 2025 goals

- Data collection and analysis facilities (AREC)
- Virtual Labs
- Harnessing Audio-visual technologies in teaching facilities
- Enhancing the Careers Portal and introducing new modules for Career Advising
- Internet of Things
- E-Learning
Thank You!