



## Vision

The vitality of water and environmental systems are indicators of a civilization's progress. Difaf is committed to contribute to an equitable and sustainable world for the growth and prosperity of communities, where clean waters are restored, ecological systems are in balance, and natural resources are conserved.

## Mission

Difaf, meaning "river banks or shorelines" in Arabic, is a concept design bureau and technical service provider for developing environmental solutions. We bring together engineering and scientific skills, policy research, and ethics into development projects. We target sectors where the largest impacts on the social and ecological environs are produced: water, wastewater, agriculture, energy, and waste management. Difaf services can cover part or the complete project cycle; from field studies and feasibility assessments, to environmental evaluations and technical designs, to procurement, commissioning, capacity building, and monitoring & evaluation.

## Solutions

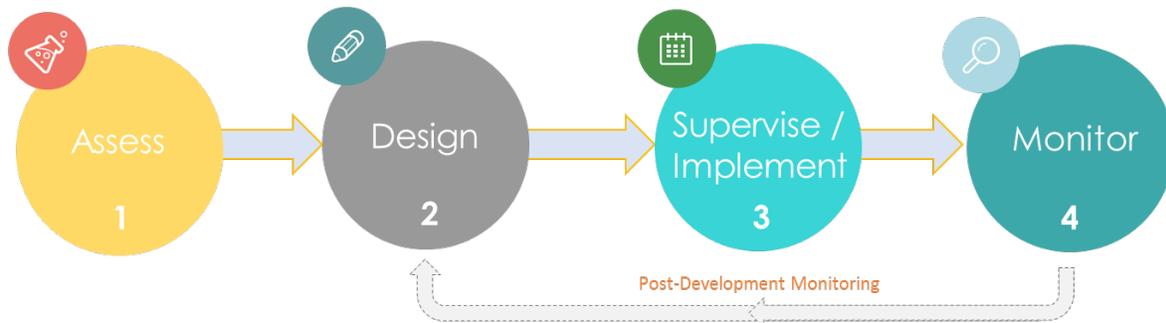
Whether for isolated services or complete turn-key solutions, Difaf solutions include:

- **Water Resources Management:** Water audits and balances, river basin and integrated water management plans, rainwater harvesting, water retention landscaping, hill-lakes, springs evaluation and protection, water treatment, recycling and monitoring.
- **Wastewater Treatment & Reuse:** Domestic, commercial, industrial wastewater treatment, grey-water treatment, constructed wetlands & reed-bed filters, reuse assessments for irrigation or commercial purposes, sludge treatment & management
- **Sustainable Agriculture:** Water-wise irrigation, aquaponics, integrated pest management, bio-fertilizers & bio-pesticides, agro-ecology techniques and aquaponics.
- **Environmental Resources Management:** Environmental assessments & auditing, waste-to-resource technologies, anaerobic digestion and biogas production, aerobic digestion and composting, renewable energy, regular/hazardous solid waste management

## Approach

With proficient project management and highly skilled national and international experts, Difaf is ready to overcome challenges with flexibility and vigilance. With both a technical and a social edge, Difaf is ready to employ participatory methods to link local knowledge with technological advancements and

strike a balance between bottom-up and top-down developmental goals. In all its work, we activate sustainability through emphasizing operational feasibility, circular economy principles, as well as post-development monitoring for proposed solutions.



## Services

Our wide range of technical and qualitative services include, but are not limited to:

- Environmental mapping, sampling, analysis, modeling, monitoring
- Hydrological and hydro-geological investigations, water balances
- Process engineering
- Organic waste treatment and composting
- Water and wastewater treatment
- Waste characterization and mass balances
- Treated wastewater evaluation and re-use
- Sludge treatment and valorization
- Watershed and river basin modelling, IWRM
- Agro-ecological methods in farming
- Nutrient uptake and recycling
- Pollution load and flux measurements
- Soil investigations and geotechnical assessments
- Environmental flow assessments (rivers, streams)
- Environmental Impact Assessments and Audits
- Water, Sanitation and Hygiene (WASH) assessments
- Multi-stakeholder analysis
- Policy and socio-economic studies
- Capacity building and trainings
- Monitoring and Evaluation for on-going or completed projects

## Sample of Difaf Clients



## All Projects

Below are some of main endeavors implemented by Difaf in Lebanon and the region:

### **Spring Water Quality Analysis Campaign (2014)**

*Client: Lebanese Mountain Trail Association (LMTA)*

Difaf assessed the quality of drinking water of springs along the Lebanon Mountain Trail (LMT) in order to identify possible sources of contamination and associated health risks. Difaf has successfully completed the water quality assessment campaign for the principal sixty springs over the period of two seasons and results were included and circulated in the LMT Springs Guidebook.

### **Geotechnical Study & Design to Increase Water Storage Capacity (2014)**

*Client: arcenciel – EC / EU*

Difaf carried out an extensive study assessing the geotechnical aspects related to increasing the water storage capacity at Domain Taanayel, Bekaa, by either increasing the storage capacity of the existing lake and/or constructing additional reservoirs next to the existing lake. The end product was a comprehensive geotechnical design for constructing one lake and digging another. Difaf supervised the implementation and monitored its success.

### **Water & Sanitation Infrastructure (WASH) Assessment (2014)**

*Client: Norwegian Refugee Council (NRC)*

Difaf completed a comprehensive WASH needs assessment survey, evaluating the technical status of the water supply and wastewater infrastructure, prioritizing interventions according to a needs assessments for twelve refugee gatherings located within or around the Tyre Caza, Lebanon.

### **Training on Permaculture Techniques (2014)**

*Client: SOILS*

Difaf prepared and conducted a practical training on Permaculture techniques for farmers in Saidoun, which included implementing composting of agricultural waste, mulching, and *Hugelkultur* raised-bed method.

### **Soil & Water Monitoring for Anjar Wetland Ecosystem (2015)**

*Client: Society for the Protection of Nature in Lebanon (SPNL)*

Difaf developed a sustainability monitoring program for indicators which were used to assess soil and water quality in Anjar and Kfar Zabad. The wetland area was declared as community-based management

systems (Hima) by respective authorities due to their high biodiversity and livelihood values. The municipalities were trained on procured water and soil monitoring instruments for addressing interventions that would assess environmental conditions for the purpose of assessing and preserving the *Hima* ecosystem.

### **Securing Clean Water to All Lebanese Public Schools (2015)**

*Client: Association of Rotary Clubs of Lebanon*

The Rotary Clubs of Lebanon have developed a project to install UV Water Filtration Systems for potable water in all public schools of Lebanon (around 1,200 schools). Difaf assessed the status of 200 WFS and developed recommendations for immediate corrective actions. Difaf also designed a sustainability model to monitor the WFS and ensure the provision of clean water for children in public schools.

### **Euro-Mediterranean Green Market Feasibility (2015)**

*Client: International Labor Organization (ITC-ILO)*

Difaf was assigned to conduct a green market analysis for new and old green businesses in the Shouf and Akkar. The research fed into an international Euro-med Green Job Analysis report containing recommendations from 5 countries for skill buildup to promote transition to greener economies across the Mediterranean.

### **Water Policy Briefs for Better Water Management in the Arab World (2016)**

*Client: Triangle Consulting*

Difaf researched and produced five policy briefs around water management issues in the Arab region, from bottling to environmental impacts of linear large projects. The briefs were meant to become infographics for international symposiums.

### **Assessment & Design of Decentralized Biogas Systems for Refugees in Lebanon (2016)**

*Client: United Nations High Commission for Refugees (UNHCR)*

Difaf partnered with Studioazue for undertaking an extensive feasibility study of decentralized biogas systems aimed to alleviate pressures on the Lebanese system from organic waste produced by Syrian informal settlements, while providing energy for refugees to ease their hardships. In 2017, the team is set to supervise the piloting of locally constructed and managed systems. If the pilot project proves successful, the systems could be up-scaled to ITS camps throughout Lebanon.

### **Small to Medium Biogas System Site-Identification in Lebanon (2016)**

*Client: CEDRO / UNDP*

Difaf's main objective was to compile a technical assessment report that identifies 7 or more potential biogas system sites preparing a methodology, target lists, logistics, developing questionnaires, surveying sites, data cleaning and analysis. The report further provides technical and economic insights and recommendations on feasibilities of small to medium size systems with notable positive impact on the environment and with high chance to succeed.

### **Technical Guidelines for Water Extraction around Protected Areas in Lebanon (2017)**

*Client: GFA Consulting Group / Ministry of Environment*

Difaf was commissioned to develop technical guidelines and policy recommendations for the Ministry of Environment to oversee the permit applications for water extraction in buffer zones of protected areas (all 15 nature reserves) in Lebanon.

### **Training on Water Resources Conservation for laa Water Committee (2017)**

*Client: MSI*

Difaf conducted an interactive workshop that trained the newly-established Water Committee of laa about the necessity to conserve water-use through practical methods and linking the community's understanding of conservation with their water cycle.

### **Training on Drip Irrigation and Water Conservation for Qaa Farmers (2017)**

*Client: MSI*

Difaf conducted a practical and theoretical workshop to 30 Qaa farmers about the relevancy of adopting drip irrigation and its impact on water conservation for irrigation use.

### **DEWATS Presentation for 30 Municipal Mayors & North Lebanon Establishment (2017)**

*Client: Madina*

Difaf presented the feasibility and application of various nature-based technologies for wastewater treatment highlighting reed-bed filters and constructed wetlands.

### **Global Research on Micro-plastics, Orb Media, University of Minnesota (2017)**

*Client: Orb Media, University of Minnesota & NY State University*

As part of a global study, Difaf was commissioned to gather water samples for the assessment of micro-plastic pollution in drinking water in Lebanon and developed the scientific survey method for this groundbreaking research.

### **Establishing a Wastewater Monitoring Unit at the Bekaa Water Establishment (2017-2020)**

*Client: Swiss Cooperation Office*

Partnering with BTD and MultiLab, Difaf has led a ten-month assessment, training and institutionalization of a wastewater treatment unit in the Bekaa Water Establishment. The aim was to empower and structure this unit in order to be able to continuously evaluate and monitor the status and functionality of the various wastewater treatment plants in the Bekaa region, as well as recommend solutions and optimization activities. In the frame of this project, Difaf performed technical assessment of five large public wastewater treatment plants: Yammouneh (capacity 788 m<sup>3</sup>/day), laa (capacity 24,000 m<sup>3</sup>/day), Zahle (capacity 40,000 m<sup>3</sup>/day), Joub-Jannine (capacity 10,000 m<sup>3</sup>/day) and Saghbine (capacity 560 m<sup>3</sup>/day). The project has been extended in order to establish a pilot program for the monitoring unit and build its capacities under the supervision of Difaf.

### **Greywater Treatment & Rainwater Harvesting for SOILS Center (2018)**

*Client: SOILS*

Difaf assessed greywater and rainwater sources at the SOILS centre and two adjacent residential structures in the Jezzine area using a water audit, and designed and implemented a greywater harvesting system that will allow residents to use treated water for irrigation.

### **Environmental Audit for a Broiler Farm (2017 - 2018)**

*Client: Hanna Assaf Broiler Farm*

Difaf provided a complete environmental audit including field measurements and surveys and a comprehensive Environmental Management Plan for a broiler farm in Bowar, Lebanon.

### **Scoping & Project Assessment of High-Value Replenish Projects in the Marshlands, Iraq (2017-2018)**

*Client: GETF*

Difaf provided consultancy services for the assessment of the project design of the treatment wetland and for the development of a GETF RFP for potential water conservation, wastewater treatment and reuse, and income generating activities. Difaf specifically evaluated the design of a constructed wetland project and its monitoring & evaluation component.

### **Feasibility: Design of WW Treatment Constructed Wetlands for Sohmor (2018)**

*Client: Sohmor Municipality*

Difaf conducted a pre-feasibility study for the design of multiple constructed wetlands systems for the treatment of municipal and industrial wastewater discharged by the village of Sohmor. The challenges of the study consisted in the different wastewater discharge points of the village. Difaf used comparative analysis between multiple systems at each point and concluded with the systems which showed to be the most effective and efficient in terms of treatment performance, physical footprint and system cost.

*Client: Anjar Municipality*

Difaf conducted a feasibility study for the design and implementation of a constructed wetland for the treatment of municipal wastewater and potential water conservation and reuse practices in the village. The study especially addressed the challenge of including large amounts of commercial wastewaters present at the village into the system. The study presented an optimized and a sustainable solution which reflected and adhered to the financial, social and ecological conditions of the village.

### **Mid-term Project Evaluation for SLWAS (2018)**

*Client: MDF*

Difaf participated in the Mid-term evaluation for a project "Strengthening Lebanese Water and Agriculture Sector (SLWAS)" led by Waternet, Acacia Water, and Wageningen University, assessing and presenting technical and institutional progress, and contributing to recommendations for improvements for the six components of the project. The project dealt with improving Bekaa Water Establishment (BWE) service delivery, Water Quality Monitoring Stations on Litani River, Small-scale storage/ artificial recharge pilot projects, on-farm water management, and advanced greenhouses for increased productivity.

### **Quantification & Characterization of Industrial Wastewater (2018)**

*Client: Mruna*

Characterization of wastewater from seven agro-processing production lines for improving industrial wastewater treatment facility.

### **Lebanon Education Program - End of Project Evaluation (2019)**

*Client: Save the Children*

Difaf evaluated the Lebanon Education Programme for Children Affected by Syrian Crisis conducted by Save the Children, which mainly aimed at improving the emergent literacy and math skills of children aged between 3 and 6 years old, and putting in place an enabling environment to improve their

education. Difaf conducted targeted interviews, focus group discussions, desk review and direct observations to assess the attainment of the program targets, and advise on future programs improvements.

### **End-of-Program Evaluation for Intaj III - SWM (2019)**

*Client: Mercy Corps*

Difaf conducted an end of program evaluation for the program "Improved Networks, Training and Jobs (INTAJ III)" led by Mercy Corps and funded by DFID, with the evaluation focusing on the impact of the program and its outcomes on the target population of the regions of Chouf Souaijani, Iqleem al Kharoub, and Minnieh, mainly regarding solid waste management and recycling (SWM/R), and management and implementation processes. The evaluation lead to providing recommendations for the next phase of program implementation (FY 2019-2021) and its possible scale-up. The project goal was the improvement of stability and SWM/R service delivery while reducing grievances and improving perceptions and trust between community members in Lebanon.

### **Wastewater Treatment Solutions for Small Dairy Industries (2018 - 2019)**

*Client: Chamber of Commerce, Industry and Agriculture (Zahleh)*

Difaf was commissioned to assess, sample analyze effluent wastewaters from small-scale dairy industries and recommend appropriate treatment technologies tailored to the various contexts of the industries in Bekaa. Difaf was also assess and design the most feasible technology and method for the dairy SMEs.

### **Training on Water Conservation for Qaa Farmers (2019)**

*Client: Qaa Farmer Committee, USAID*

Along with a professor of the Faculty of Agriculture of the Lebanese University, Difaf conducted a training for 20 farmers on water conservation and irrigation good practices in the context of water shortage in Qaa region.

### **Capacity and Strategy Workshop on Environmental Hotspots (2019)**

*Client: United Nations Environment Program (UNEP)*

In the frame of a project implemented by UNEP and the Lebanese Ministry of Environment, Difaf carried out a factual update of the Environmental Assessment of the Syrian Crisis Report published by UNDP in 2014 to identify priority environmental issues in the sectors of Waste Management, Water and Wastewater, Air Quality, and Ecosystem and Land-Use in Lebanon. Based on the results of this assessment, Difaf supported the conduction of a workshop aimed at raising awareness on ecosystem

services and disaster risk reduction, and developing agendas for action to address priority environmental issues in Lebanon.

### **Ghzayel River Flood Risk Assessment (2019)**

*Client: Lebanese Reforestation Initiative*

Difaf was commissioned to conduct a flood risk assessment of Ghzayel River (tributary of the Litani River) with the main benefit being the development of a site specific riparian rehabilitation plan over the 25 km stretch of the river. Difaf developed a hydrological study and a hydraulic model of the river based on topographic data and hydrological information on the watershed. This model was used to map the flood-plain for different flood return periods and develop a flood risk assessment report for the area including recommendations and mitigation measures to be applied for the riparian rehabilitation project which will be designed and implemented by LRI.

### **Technical Assistance for Wastewater Treatment Design & Installation (2019)**

*Client: Action Against Hunger – Lebanon*

Difaf was approached by ACF in order to execute an upgrade plan of the existing wastewater treatment plant of a Refugee Camp in the Bekaa region, designed by ACF, with the collaboration of the Ministry of Environment. Difaf upgraded a tank into a trickling filter and incorporated into the system design an H<sub>2</sub>S removal system. Difaf was responsible for the procurement, installation, and commissioning of the required items.

### **Training in the Waste Management & Recycling Field to Young Professionals in Iraq (2019)**

*Client: GIZ*

In the frame of the project "Private Sector Development & Employment Promotion" implemented by the GIZ in Iraq, Difaf, along with its partner Blackforest GmbH, conducted a series of trainings for around 150 young professionals in Baghdad in order to provide them with fundamental technical and economical knowledge for their own business plan development in the waste management sector. Difaf specifically provided trainings on the reuse of food waste for animal feed, biomass waste for composting and recovery of proteins from whey wastewater after dairy cheese production.

### **Mid-Term and End-Term Evaluation of Integrated Natural Resource Management of Union of Tyre Municipalities Project (2019 & 2020)**

*Client: INTERSOS*

Difaf performed the Mid-term and End-term evaluations of the project "Integrated Natural Resource Management of Union of Tyre Municipalities" implemented by INTERSOS, which aims at supporting

Municipalities of the Union of Municipalities of Tyre to enhance Solid Waste management in order to improve hygienic and environmental conditions for their citizens. The evaluation relied on desk reviews, interviews and focus group discussions to assess the success of the project, and the development of elaborate recommendations for future phases.

### **SUPROMED: Sustainable Production in Water-Limited Environments of Mediterranean Agro-Ecosystem (2019 - ongoing)**

*Client: EU – PRIMA Program*

In a Mediterranean-wide consortium led by the Universidad de Castilla-La Mancha (UCLM), SUPROMED is a project aimed at providing decision-making support to improve farming methods in Mediterranean agro-ecosystems through the introduction of technical packages and good agricultural practices. Difaf is responsible for the assessment of the socio-economic and environmental impacts of the project deployment in Lebanon, as well as for policy assessments and drawing up policy recommendations at both the Lebanese and the Mediterranean scales based on the project results.

### **Training on Leachate Treatment to Algerian Ministry of Environment (2019)**

*Client: GIZ*

Difaf has been commissioned to provide a technical training on leachate management to engineers of the Algerian Ministry of Environment and Renewable Energy and of the National Waste Agency. The aim of this training was to build the capacity of these engineers on integrated management of leachate based on state-of-the-art technology and good practices.

### **Sustainable Facility Management at Public Schools (2020-ongoing)**

*Client: GIZ*

Difaf is providing technical assistance to GIZ as an expert for water management systems under the project "Sustainable Facility Management at Public Schools in Lebanon" (SUFA). The project aims to improve the maintenance of public schools and the learning environment to introduce the concept of green schools. Difaf's scope of work includes the water-use assessment of several public schools across Lebanon, recommendation of green measures to maximize the water-use efficiency and decrease the footprint of the schools, the supervision of the green measures implementation, and the follow-up and training of the schools' technical staff on sustainable operation and maintenance.

## Awards

### Abillama Eco-Entrepreneurship Award: 1<sup>st</sup> Place

As part of the Abillama Eco-Entrepreneurship Award, Difaf put forward a business model for the ideal aquaponics project in Lebanon and won the prize for proposing a feasible project that complies with eco-entrepreneurship indicators and has a desirable impact on water resources using an advanced and environmentally friendly agricultural method.



### CEWAS Middle East Award for Best Eco-preneurship Business Idea: 2<sup>nd</sup> Place

Difaf won second place for the best business idea aiming at streamlining decentralized wastewater management through a lease-to-own wastewater systems distribution.



## Notable Affiliations

- Officially recognized an environmental consultancy provider by the Lebanese government (Ministry of Environment / CDR)
- Officially recognized partner in SUSANA network
- Official recognized partner in RainforClimate network

