POWERING THE FUTURE WE WANT
SOLAR MARKET GARDENS IN BENIN

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Solar Electric Light Fund

Solar Electric Light Fund

- Washington, D.C.
- Founded in 1990
- Initial focus: household lighting
- 20 countries: Asia, Africa, South America, and the Caribbean

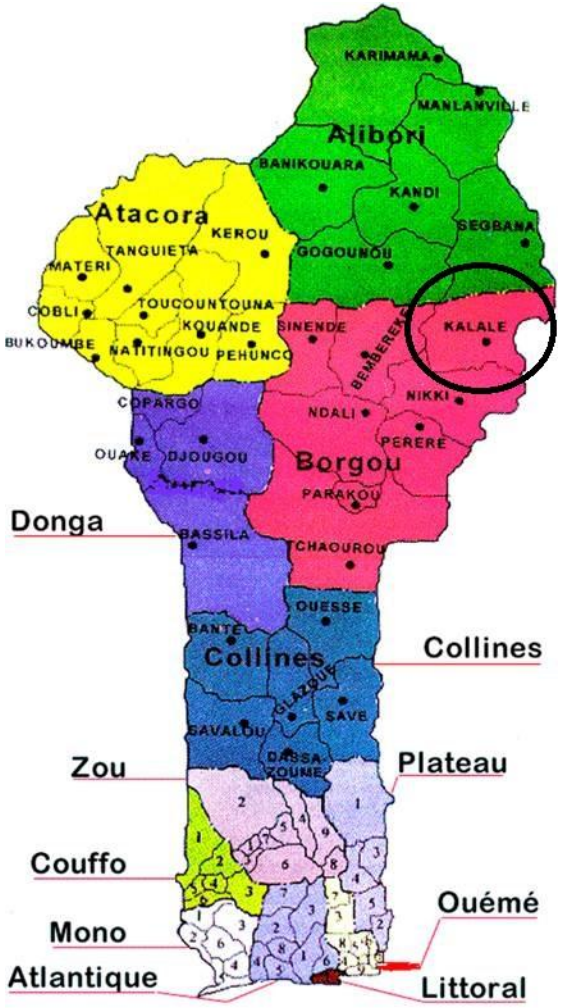
Benin Solar Market Gardens

QUICK DESCRIPTION:

- Combining solar water pumping with drip irrigation
- Organizing and supporting 11 collectively farmed .5Ha gardens in 10 communities– formed into an organization run by the 400+ women gardeners
- Achieving community benefits in food security, nutrition, income generation and gender equality.

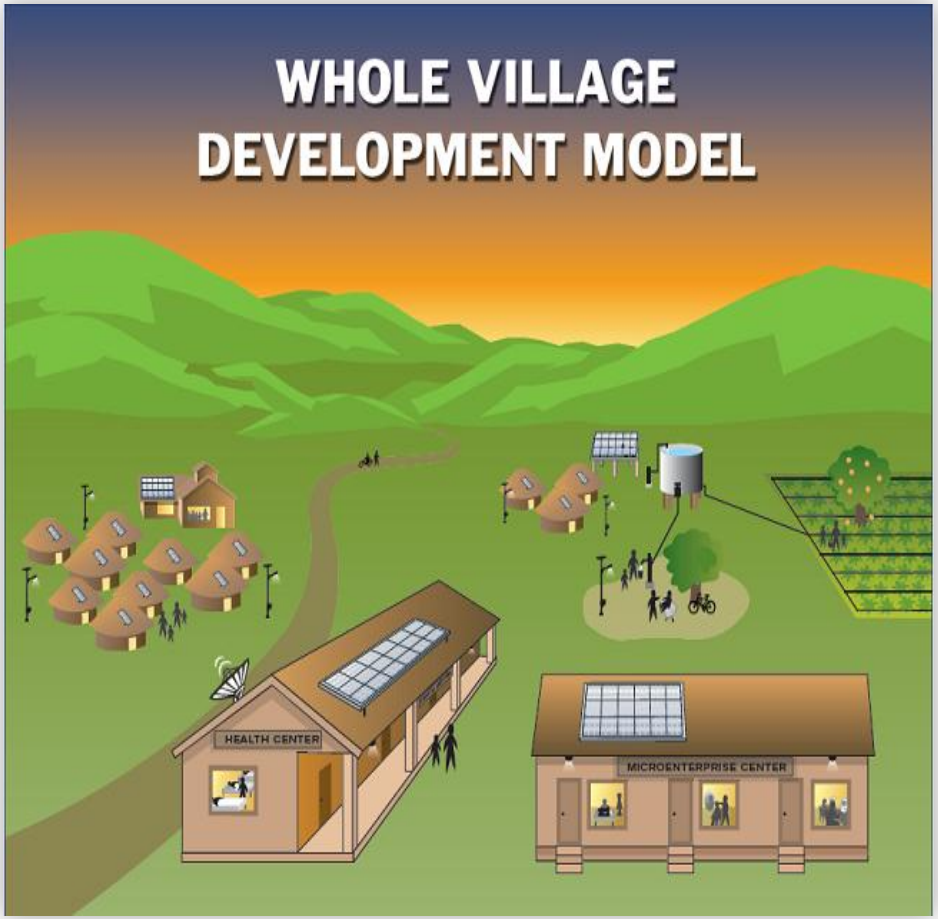
Kalale District, Benin

- Local NGO, ADESCA (L'Association pour le Développement Economique Social Culturel et l'Autopromotion) in the Kalalé Commune of the Borgou Region in north-eastern Benin
- Partnership began in 2005



ADESCA ONG

Whole Village Development Model



Mission: use solar to assist those living in Energy Poverty through *Whole Village Development Model*:

- *Food & Water Security*
- *Education*
- *Health*
- *Enterprise*

Benin Solar Market Gardens

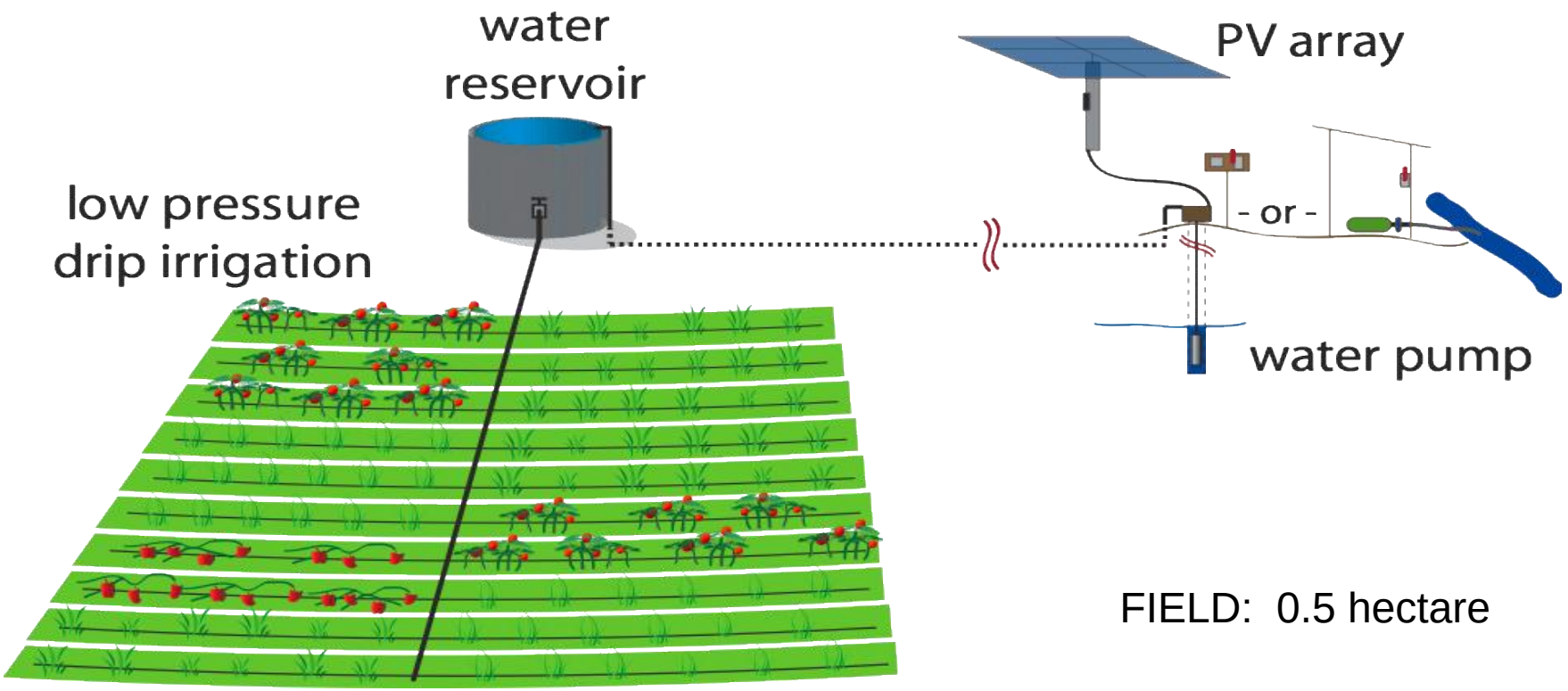
- Local leaders in Bessassi and Dunkassa, who identified food security as a top priority

PILOT: Solar Market Garden

- Collaborated with the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) to install drip irrigation systems and introduce modern agricultural techniques and equipment

ENERGY IS A HUMAN RIGHT™

PILOT: What is solar-powered drip irrigation?



Solar Pumps
- Simple and safe
- Immune to oil prices
- Wide range of specs
- Direct coupling

+

Drip Irrigation
- Efficiency, uniformity
- Labor saving
- Fertigation
- New products

FIELD: 0.5 hectare

RESERVOIR: 21 m^3

SOLAR ARRAY: ~1 kW

SMG Installation: Preparation

SMG Installation: Water Tank Construction

SMG Installation: PV and Pumping Systems

SMG Installation:
Drip Irrigation Lines & Fencing

SMG Installation: Planting

SMG Installation: Completion

Project Phases

Phase 1: (Pilot Phase) Completed 2006

- Activation of first 3 SMGs

Phase 2: (Validation Phase) Completed 2013 - 2014

- Installation of 8 additional SMGs
- Detailed garden production study

Phase 3: (Optimization Phase) Ongoing

- Optimize production and income generation
- Document a sustainable and replicable model
- Disseminate the model for others to use.

PILOT: Results

- 1.9 tons of produce each month per Solar Market Garden.
- $7.50 in income per farmer per week
- 2009-2010 dry season revenue of $3,961 per SMG; 69% of annual expenses
- Farmers planning to send children to school: 4% before SMGs; 22% after one year

PILOT: Results

Stanford University conclusions:

“. . .significantly augments both household income and nutritional intake.”

“Scaling this technology will undoubtedly face challenges, but successful widespread adoption could be an important source of poverty alleviation and food security in the marginal environments common to sub-Saharan Africa.”

Proceedings of the National Academy of Sciences
Vol 107, No. 5,
February 2, 2010,
pp. 1848-1853+

PHASE 1: Success & Replication

- Due to the success of the Pilot phase, SELF received funding from the Nordic Development Fund (NDF) and the Nordic Environment Finance Corporation (NEFCO), and partnered with Naps Systems to initiate Phase 2 of the project

NDF NORDIC DEVELOPMENT FUND

NEFCO NORDIC ENVIRONMENT FINANCE CORPORATION

NAPS

PHASE 2: Objectives

- Increase the scale of the project.
- Set the stage to scale-up the SMG model for future replication in other locations.
- Validate results of the Pilot Project.
- Maximize the benefit of the gardens.
- Implement the other aspects of the Whole Village Development Model.

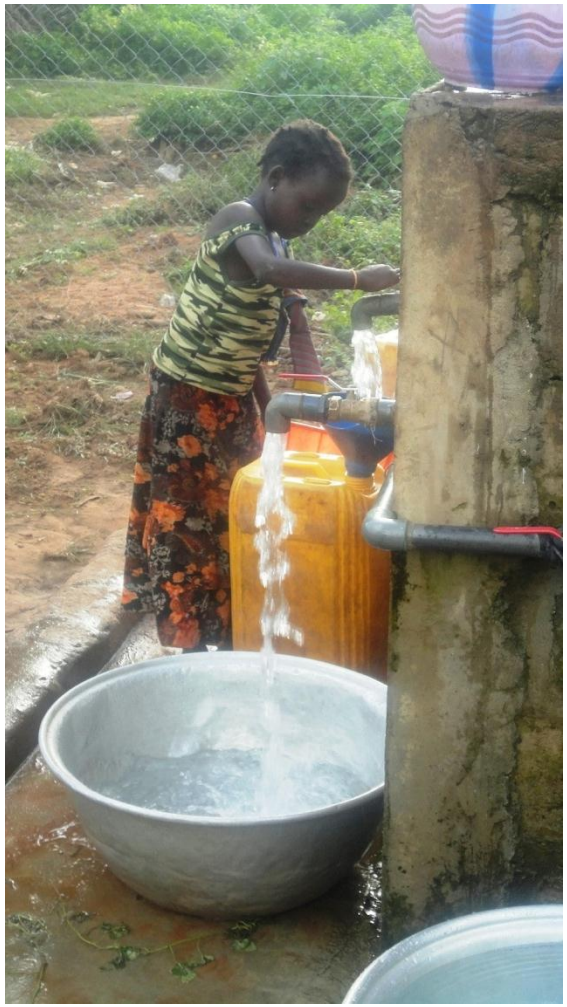
PHASE 2: Growth and Local Capacity Building

- Community PV training
- Two new solar and hortigultural technicians hired
- Continued operational training with farming collectives

Tournée de Moringa

dans la Commune de Kalalé

WVDM Components

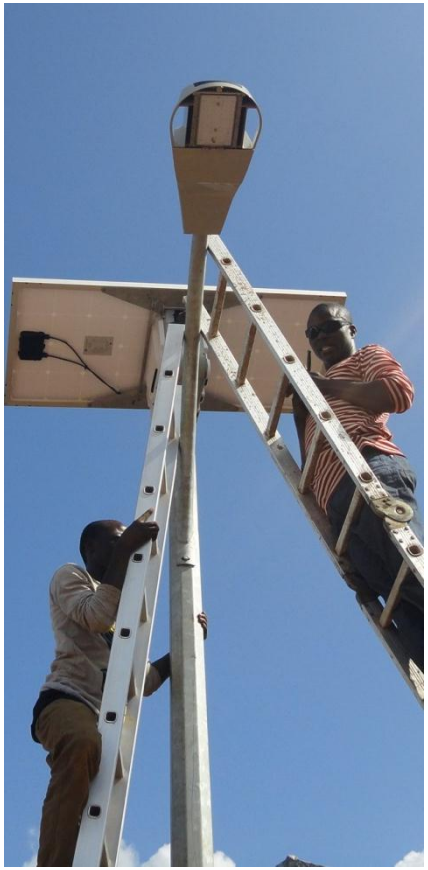


- Solar-Powered potable water pumps that improve food and water sanitation
- Solar electrification of primary and junior high schools to serve as educational resources
- Solarization of health centers to improve the quality of health care

ENERGY IS A HUMAN RIGHT™

WVDM Components

- Street and market lighting to improve safety and increase after-dark economic activity
- Construction of Micro-Enterprise Centers that will bring previously unavailable goods and services to the village, improving quality of life through food availability, animal husbandry, business viability and economic stimulus



PHASE 2: SMG Beneficiaries

- 426 farmers and their families directly benefit from the produce and increased income

- 48,000 people in the villages benefit from the availability of high-quality produce during the dry season

Micro-Nutrient Study

- Halimatou Alaofe Ph. D, University of Arizona
- Baseline study conducted in 2011
- 8 newest ASMG villages, 8 control villages
- 960 families surveyed
- Up to 1,920 biomedical samples recorded (weight, height cranial circumference, blood and serum samples)

THE UNIVERSITY OF ARIZONA®

SMG Production & Market Survey

- Dr. Jennifer Burney – UCSD, Stanford University
- 11 gardens surveyed during 7-day weeks over 5 months
- Tracking input, production, distribution, revenue

University of California San Diego

ADESCA ONG

PHASE 3: Optimization

Optimize:

- Food Production
- Income Generation
- Replicability
- Sustainability

Three year Time Frame

- Year One: assessments, planning and training
- Year Two: optimization measures
- Year Three: evaluation, documentation, dissemination

PHASE 3: Optimization

Focus on improvements:

- Field inputs (water, fertilizer, compost, etc.)
- Growing techniques(basic hort. practices)
- Crop selection
- Marketing opportunities
- Increasing garden size
- Organizational development of garden groups
- Continued capacity development of ADESCA staff

PHASE 3: Optimization

Committed to:

- Achieving financial sustainability
- Full documentation of the model for use by others
- International dissemination of the model

Factors for Success

- Enough users to support pumping and irrigation systems
- Strong local org. to support the groups technically, financially and administratively
- Born from the stated needs of the communities
- Long term commitment from SELF, ADESCA, partners and funders
- Commitment to capacity building
- Commitment to evaluation, learning, adjusting, improving

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