Microfinance for Ecosystem-based Adaptation

MEbA – Understanding Climate (Change) Risks, Financing Adaptation

Christoph Jungfleisch
FS-UNEP Collaborating Centre on Climate and Renewable Energy Finance
Washington, 15 of October 2015
Microfinance institutions form part of rural “networks of trust” and serve the “last mile”

*Introduction: MEbA project*

- Financed by the **German Federal Ministry of Environment (BMUB)**, implemented by **UNEP and Frankfurt School**
- **5 partner MFIs** in Colombia and Peru – Bancamía, Crezcamos, Contactar, Solidaridad and Fondesurco
- Targeting the enhancement of resilience and **adaptive capacity of vulnerable rural populations**
- Focussing on **capacity building** of the microfinance sector, to autonomously act as **multiplier of climate change adaptation**
Small landholders are most vulnerable to climate change and play an important role in rural development

Introduction: Why small landholders?

- Low emission levels
- Low technification, so prone to CC risks
- Drivers of food security
- Drivers of rural development
- Responsible for food safety
- Direct impact on ecosystem services for urban centres
- High costs for disaster relief

Main bottlenecks – ADAPTIVE CAPACITY:

Awareness  Know-how  Finance
Adaptation of clients as risk reduction of financial institutions - a process rather than an activity

*Introduction:* What is Adaptation? What is EbA??

**Adaptation**

Adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities (*IPCC*, 2001a).

**Ecosystem-based Adaptation**

The use of biodiversity and ecosystem services as part of an overall adaptation strategy to help people to adapt to the adverse effects of climate change (*CBD*, 2009).
Working definition: Vulnerability = \textit{Exposure} + \textit{Sensitivity} - \textit{Adaptive capacity}

\textit{Introduction: Vulnerable clients?}

“Fixed” reality: precipitation and temperature patterns, soil type, topography, ecosystem

“Variable” reality: economic activity inherent sensitivities to specific exposure, e.g. crop sensitivities

“Productive” reality: how are exposure and sensitivity managed
Exposure
Creating the basis for the right questions to identify own, individual actions to climate change

*Exposure: Systemization of climate (change) risks*

**HAZARDS**

**Regional level: realities we cannot control**

- Vientos fuertes
- Lluvias intensas
- Heladas
- Cambios en patrones de lluvias
- Cambios bruscos de temperatura
- Extremos de calor
- Granizo
Maps help to categorize and systemize exposure levels – MEbA: free DB

Basic components of risk management: maps/data

<table>
<thead>
<tr>
<th>Variables</th>
<th>Dataset Name</th>
<th>Spatial resolution</th>
<th>Temporal resolution</th>
<th>Update frequency</th>
<th>Price</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature</td>
<td>CHIRPS2*</td>
<td>5 km</td>
<td>Monthly</td>
<td>n/a</td>
<td>Free</td>
<td>U.S. Geological Survey with University of California in Santa Barbara</td>
</tr>
<tr>
<td>Ecosystems (land cover)</td>
<td>Ecological land unit map</td>
<td>250 m</td>
<td>n/a</td>
<td>n/a</td>
<td>Free</td>
<td>U.S. Geological Survey</td>
</tr>
<tr>
<td>Soils (texture)</td>
<td>Harmonized World Soil Data</td>
<td>900 m</td>
<td>n/a</td>
<td>n/a</td>
<td>Free</td>
<td>FAO/Unesco and U.S. Geological Survey</td>
</tr>
<tr>
<td>Altitude and slope</td>
<td>SRTM DEM</td>
<td>90 m</td>
<td>n/a</td>
<td>n/a</td>
<td>Free</td>
<td>NASA and U.S. Geological Survey</td>
</tr>
</tbody>
</table>

*Climate Hazard Group Infrared Precipitation with Stations data v2
**For the project purpose, monthly data from last 30 years is being used
Sensitivity
Creating the basis for the right questions to identify own, individual actions to climate change

*Exposure: Systemization of climate (change) risks*

**IMPACTS**

**Producer level: effects on productive systems which we can manage**

**1st order**

- Aumento de plagas
- Inundaciones
- Deslizamientos
- Cambios fenológicos
- Erosión
- Incendios
- Menor disponibilidad de agua
- Secuías

**2nd order**

- Necesidad de mayores insumos
- Pérdida de cosechas
- Menor seguridad alimentaria
- Pérdida de productividad
- Daños a cultivos
- Avenidas
Via the systemization of crop/animal development displaying of practices and sensitivity in time

**Sensitivity:** crop/animal development models*

1. Fenological phases
2. Typical practices
3. Processing
4. Climate sensibilities
5. Pests
6. Other and literature

* - sensitivity data from FAO Ecocrop
Crops and animals, and their sub-varieties, with differing climate sensitivities that define optimum management.

**Sensitivity:** example temperature and crop management*

- **30 ºC**
  - Kill temperature (time sensitive)
- **25 ºC**
  - Temperature of sub-optimum development
- **15 ºC**
  - Temperature for optimum development
- **0 ºC**
  - Temperature of sub-optimum development
  - Kill temperature (time sensitive)

* - random example for illustration

- **Earliest sowing**
- **Latest harvest**

Temperature projection
Adaptive capacity
Management of ecosystems and their services central part of adaptation of small landholders

Capacity: measuring via EbA index

- Ecosystem-aligned practices
- Measurement of adaptation activities’ impact
- Expressed per client and portfolio

* - the actual index comprises 16 categories
Systemization in a catalogue (expandable!) of 40 first EbA options that address impacts

**Capacity:** enhancement via dedicated EbA options

<table>
<thead>
<tr>
<th>MEDIDA</th>
<th>IMPACTOS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abonos orgánicos</td>
<td></td>
</tr>
<tr>
<td>Piscicultura</td>
<td></td>
</tr>
<tr>
<td>Agricultura de conservación</td>
<td></td>
</tr>
<tr>
<td>Agricultura ecológica</td>
<td></td>
</tr>
<tr>
<td>Agricultura orgánica</td>
<td></td>
</tr>
<tr>
<td>Apicultura</td>
<td></td>
</tr>
<tr>
<td>Banco de semillas</td>
<td></td>
</tr>
<tr>
<td>Barreras rurales</td>
<td></td>
</tr>
<tr>
<td>Biogas</td>
<td></td>
</tr>
<tr>
<td>Captadores de niebla</td>
<td></td>
</tr>
<tr>
<td>Deshidratadores solares</td>
<td></td>
</tr>
<tr>
<td>Diversificación de cultivos</td>
<td></td>
</tr>
<tr>
<td>Drenajes</td>
<td></td>
</tr>
<tr>
<td>Ecoturismo</td>
<td></td>
</tr>
<tr>
<td>Estufas eficientes de leña</td>
<td></td>
</tr>
<tr>
<td>Francas cortafuegos</td>
<td></td>
</tr>
<tr>
<td>Hidroponía solar</td>
<td></td>
</tr>
<tr>
<td>Huertos familiares</td>
<td></td>
</tr>
<tr>
<td>Invernaderos</td>
<td></td>
</tr>
<tr>
<td>Lombricomposto</td>
<td></td>
</tr>
<tr>
<td>Manejo forestal sostenible</td>
<td></td>
</tr>
<tr>
<td>Manejo integral de nutrientes</td>
<td></td>
</tr>
<tr>
<td>Manejo integral de plagas</td>
<td></td>
</tr>
<tr>
<td>Acondicionamiento de suellos</td>
<td></td>
</tr>
<tr>
<td>Muros de contención natural</td>
<td></td>
</tr>
<tr>
<td>Permacultura</td>
<td></td>
</tr>
<tr>
<td>Presas filtrantes</td>
<td></td>
</tr>
<tr>
<td>Reservorios para agua de lluvia</td>
<td></td>
</tr>
<tr>
<td>Restauración de suelos</td>
<td></td>
</tr>
<tr>
<td>Riego por goteo</td>
<td></td>
</tr>
<tr>
<td>Rotación de cultivos</td>
<td></td>
</tr>
<tr>
<td>Sistema agrosilvopastoril</td>
<td></td>
</tr>
<tr>
<td>Sistema silvoagrícola</td>
<td></td>
</tr>
<tr>
<td>Sistema silvopastoril</td>
<td></td>
</tr>
<tr>
<td>Sombra natural</td>
<td></td>
</tr>
<tr>
<td>Suka kellos</td>
<td></td>
</tr>
<tr>
<td>Terrazas</td>
<td></td>
</tr>
<tr>
<td>Tinajas de agua</td>
<td></td>
</tr>
<tr>
<td>Viveros mixtos</td>
<td></td>
</tr>
<tr>
<td>Zanja-bordo</td>
<td></td>
</tr>
</tbody>
</table>

* - the complete manual of EbA options is to be found at www.pnuma.org/meba
Research and systemization to back up adequate and suitable EbA options

**Capacity:** providing solutions (I)

1. What impacts are addressed?
2. In what time results can be expected?
3. Implementation scale and focus:
   - Individual/collective
   - Investment/support
4. Where possible, graphs illustrate implementation

* - The complete manual is to be found at www.pnuma.org/meba
TechCards explaining each EbA option to support training measures of target populations

**Capacity:** providing solutions (II)

1. What threats/hazards are addressed?

2. With what other options can it be combined?

3. Implementation costs
   - Labour
   - Materials
   - Training

4. Ecosystem and productive benefits

* - the complete manual is to be found at www.pnuma.org/meba
Financing Adaptation
1. Identification of threats, impacts, effects on client and effect on portfolio and sub-portfolio

2. Presentation of instruments
   1. Exposure limits
   2. Loan loss provisions
   3. Climate smart loan terms
   4. Adaptation products
   5. Insurance products

3. Contingency planning

4. Procedures supporting risk management using a dedicated software (CEUS)
Smart ICT solution allow to get a comprehensive understanding of investment targets while increasing efficiency

**Microfinancing adaptation: Smart ICT**

**MAPS**
- Soil, topography, ecosystem, temperature, precipitation

**GENERIC**
- Crop/animal Models

**LOCAL**
- Practices, phases, inputs, outputs (volumes and prices)

**Expert team (agronomist, economist, veterinarian, geographer) – Data Management**

**Credit committee**

**Client visit:**
- Georeference
- Activities
- Practices
- In- and outputs
- Verification of
  - Exposure,
  - Vulnerabilities
- Adaptive capacity

**DB**

**Monitoring**

**Feedback**
Usually “undifferentiated” financing via short-term financing options, not suitable for MEbA

**Microfinancing adaptation**: vs. traditional MF*

- **‘high hanging fruits’**: with long-term focus, high public sector attention necessary, hard to engage MFIs
  - Agricultural terraces
  - Sustainable forest management
  - Equipment

- **‘low hanging fruits’**: Short payback period immediately increased household cash flow
  - Crop rotation + diversification
  - Drip irrigation
  - Organic fertilizer
  - Working capital

**Average loan maturity 6 – 18 months**
Adaptation finance, especially for the most vulnerable opens new opportunities – New investment products possible

**Financing adaptation: Investors’ benefits**

- Informed risk management
- Risk adjusted pricing
- Real-time performance monitoring
- Environmental risk management
- Non financial services
- Ecosystem benefits
- Climate-smart lending

**PROFIT**

- Customer understanding & segmentation
- Efficiency through automation
- Automated but customized products

**RETURNS**

- Poverty reduction
- Capacity building
- Products for resilience
- Community building

**PEOPLE**

- Economic incentives for adaptation through RAP
- Real-time due diligence
- Triple bottom-line bonds
- Risk transfer markets
GRACIAS

Christoph Jungfleisch
Frankfurt School Project Director
PNUMA
Edificio 103, Avenida Morse,
Ciudad del Saber, Clayton
P.O.Box: PNUMA 0843-03590
Balboa Ciudad de Panamá, Panamá

c.jungfleisch@fs.de
Tel: +507 305 3165
Cel: +507 6256 2105
Back-up
Products: MEbA options

TechCards with information on costing, processes for implementation and ecosystem and financial benefits

Adressing climate risks in terms of threats and impacts

Medidas EbA con el objetivo de mitigar impactos “controlables/manejables”:
Decremento de gastos operativos – Diversificación de ingresos – Mitigación de riesgo climático – Gestión de ecosistemas
Types of MEbA measures

A wide variety of robust options intended to address climate impacts, emphasis on diversifying practices and income

- **Conceptual pillars**
  - Agroecology, Permaculture

- **Agricultural support**
  - Organic fertilizers, vermicompost, soil conditioning, water reservoirs, drainage systems, contour trenches

- **Better agricultural practices**
  - Organic agriculture, conservation agriculture, crop diversification, crop rotation, integrated nutrient management, integrated pest management

- **Ecological support**
  - Beekeeping, seed banks, sustainable forest management, soil restoration, fire prevention trenches, retention walls, filtering dams, infiltration pits, ecotourism, plant nurseries

- **Mixed systems**
  - Agrosilvopastoral, Silvopastoral, Agroforestry, Natural shade, windbreaks, family orchards

- **Technological improvements**
  - Biodigesters, fog catchers, solar dehydrator, efficient woodstoves, solar hydroponics, greenhouses, aquaculture, drip irrigation

- **Ancient practices**
  - Terraces, Waru Waru
## Products and services: costing

<table>
<thead>
<tr>
<th>MANO DE OBRA</th>
<th>#</th>
<th>Unidad</th>
<th>#/Jornal</th>
<th>USD/Jornal</th>
<th>Jornales</th>
<th>Monto (USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trazado detallado</td>
<td>25</td>
<td>m²</td>
<td>150</td>
<td>15</td>
<td>1</td>
<td>15</td>
</tr>
<tr>
<td>Excavación manual</td>
<td>1</td>
<td>m³</td>
<td>3</td>
<td>15</td>
<td>1</td>
<td>15</td>
</tr>
<tr>
<td>Armado y colado de piso</td>
<td>15</td>
<td>m³</td>
<td>5</td>
<td>15</td>
<td>3</td>
<td>45</td>
</tr>
<tr>
<td>Construcción de paredes</td>
<td>15</td>
<td>m²</td>
<td>2</td>
<td>15</td>
<td>8</td>
<td>120</td>
</tr>
<tr>
<td>Construcción tapa</td>
<td>15</td>
<td>m³</td>
<td>5</td>
<td>15</td>
<td>3</td>
<td>45</td>
</tr>
<tr>
<td>Preparación de la tierra</td>
<td>2</td>
<td>m³</td>
<td>2</td>
<td>15</td>
<td>1</td>
<td>15</td>
</tr>
<tr>
<td>*construcción de invernadero</td>
<td>1</td>
<td>lote</td>
<td>0.1</td>
<td>30</td>
<td>10</td>
<td>300</td>
</tr>
<tr>
<td><strong>Subtotal USD</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>555</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MATERIALES</th>
<th>#</th>
<th>Unidad</th>
<th>Costo unitario (USD)</th>
<th>Monto (USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acero</td>
<td>1</td>
<td>lote</td>
<td>350</td>
<td>350</td>
</tr>
<tr>
<td>Cemento</td>
<td>4</td>
<td>t</td>
<td>120</td>
<td>480</td>
</tr>
<tr>
<td>Tierra fértil</td>
<td>2</td>
<td>m³</td>
<td>75</td>
<td>150</td>
</tr>
<tr>
<td>Grava</td>
<td>3</td>
<td>m³</td>
<td>5</td>
<td>14</td>
</tr>
<tr>
<td>Arena</td>
<td>3</td>
<td>m³</td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td>Ladrillo</td>
<td>500</td>
<td>pza</td>
<td>0.5</td>
<td>225</td>
</tr>
<tr>
<td>Tanque de 60 lts</td>
<td>2</td>
<td>pza</td>
<td>25</td>
<td>50</td>
</tr>
<tr>
<td>Tapa de triplay</td>
<td>4</td>
<td>pza</td>
<td>40</td>
<td>160</td>
</tr>
<tr>
<td>Manguera</td>
<td>20</td>
<td>m</td>
<td>2</td>
<td>30</td>
</tr>
<tr>
<td>Lombriz y sustrato</td>
<td>50</td>
<td>kg</td>
<td>2</td>
<td>100</td>
</tr>
<tr>
<td>*Material de invernadero</td>
<td>1</td>
<td>invernadero de 20m²</td>
<td>1200</td>
<td>1200</td>
</tr>
<tr>
<td><strong>Subtotal USD</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>2767</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CAPACITACIÓN</th>
<th>#</th>
<th>Unidad</th>
<th>Costo unitario (USD)</th>
<th>Monto (USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mano de obra especializada</td>
<td>2</td>
<td>días</td>
<td>60</td>
<td>120</td>
</tr>
<tr>
<td><strong>Subtotal USD</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>120</strong></td>
</tr>
<tr>
<td><strong>Total USD</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>3442</strong></td>
</tr>
</tbody>
</table>
CEUS MEbA: Backend decisive, frontend still very basic design
Simplification of TechCards for target populations in order to introduce awareness of EbA options

**Capacity:** raising awareness
Awareness raising board game: economic games for front office personnel and clients
Perspectives: Latin America

Pilotos (marzo 2015)
2,292 operaciones
USD 3.5 m

Proyecciones por 4 IMF (5 años)
24,120 operaciones
USD 19.4 m

Portafolio de IMF MEbA (a marzo 2015)
120,603 operaciones
USD 110.3 m

Total Agri-finance portfolio served in Peru and Colombia (as of June 2014)
647,973 family units
USD 777.6 m*

Total potential Agri-microfinance portfolio in Peru and Colombia (as of June 2014)
3.37 m family units
USD 4,039.6 m

Total potential Agrimicrofinance portfolio in Latin America (as of June 2014)
11.5 m family units
USD 13,800 m