WATER PURIFICATION PROJECT

Luang Prabang - Laos
Needs assessment

- Landlocked country in South-East Asia
- Seasonal weather conditions (dry and wet seasons)
- River Mekong and its tributaries as the main surface water body
- Poor public drinking water network
- Rural areas without access to safe, potable water
The local water purification system

Basic expectations

- Water purification system needs to be:
  - Simple
  - Safe
  - Easy to operate & maintain
  - Inexpensive
  - Replicable
  - Developed & built with locals for the locals
The local water purification system

*Establishing the basics*

- Following the WHO potable water guidelines & thresholds due to lack of local drinking water quality standards
- Analysing local drinking water practices & habits
- Analysing eligible raw water sources (e.g. no heavy metal or chemical contaminations) for the purification process
The local water purification system

The way forward

• Eligible raw water sources identified (Mountain Springs, River Mekong, River Khan and tributaries)
• Partners identified (ERM Foundation & BADUR Foundation)
• Development of the first purification systems for testing purposes in 2011 & 2012
The local water purification system

*Development phases – principles & experience*

**Testing results:**
- Systems are simple, inexpensive and easy to operate, **but:**
  - Low drinking water production capacity
  - Slow purification procedure, due to weather conditions (mostly cloudy)
  - Treated water partially still contaminated with bacteria
The local water purification system

*Principle of the final system*

- **raw water**
- **100 l drum**
- **Bioactive layer**: “Schmutzdecke”
- **Sand layer**
- **Gravel layer**
- **UV-Lamp Tube**
- **drink water**

**Testing results:**
- Simple, inexpensive, easy to operate, safe and replicable
- Fast and safe purification procedure with high capacity
- **Fulfills all basic expectations**
The local water purification system

*Continuous monitoring*

- Continuous monitoring of the purification systems with our own on-site microbiological water testing laboratory kit (Wagtech Potatext®)

- Analytical threshold limits according to the WHO Guidelines for drinking-water quality

- On-going monitoring to gain more information & experience from daily operation & maintenance
The local water purification system

Facts

- Drinking-water production capacity: **5 l/min**

- Total cost of the water purification system (incl. UV-lamp): **350 USD**

- UV-lamp lasts for approx. 3-4 years (by daily operation of 1-2h); UV-lamp replacement cost: **80 USD**

- Sand & gravel needs to be changed & cleaned every 2-3 months (by daily operation); cost factor: **20 USD**

✓ Made of locally available materials and equipment

✓ No need for electricity - UV lamp can be also operated with a simple solar panel (solar panel app. 150 USD)

✓ 1 purification system is capable of providing drinking water for a community with 30-40 people

✓ Successfull operation of currently 8 systems in the Luang Prabang region since 2012
Need for more

- The Buddhist Academy educational facility has currently more than 400 pupils & teachers in a remote area without access to safe drinking-water

- Bottled drinking-water must be purchased & transported to the site (>600 USD / month)

- Plastic bottle (=waste) generation is significant as well (no waste treatment available)

> Water purification system with bigger capacity is needed
The costs of a purification system with increased capacity

- 3 x 1000 l Stainless Tanks – 585 USD
- 3 x 30 Watt UV Light Filters – 690 USD
- 3 x Tank Lids w/ Stop valve – 225 USD
- Reinforced Concrete Base Pad – 150 USD
- Fabricated Steel UV Filter Boxes – 240 USD
- Electrical Connection Materials – 120 USD
- 3 x Spare UV Light Tubes – 270 USD
- Pipes, Taps, Fittings – 315 USD
- Sand & Gravel for Filters – 80 USD
- Transportation – 150 USD
- Protective Steel Cage & Locks – 300 USD
- Labour – 225 USD
- Initialisation & Testing – 100 USD

**Total Cost: 3,450 USD**

Return on investment against cost of purchasing bottled drinking water realised in < 6 months.