Improved Lighting for Indian Fishing Communities

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Outline

- Why is this project important?
- Field trip report
- Current lighting technology and costs
- User Needs
- Product testing
- Fishing light

Why is this **project important?**

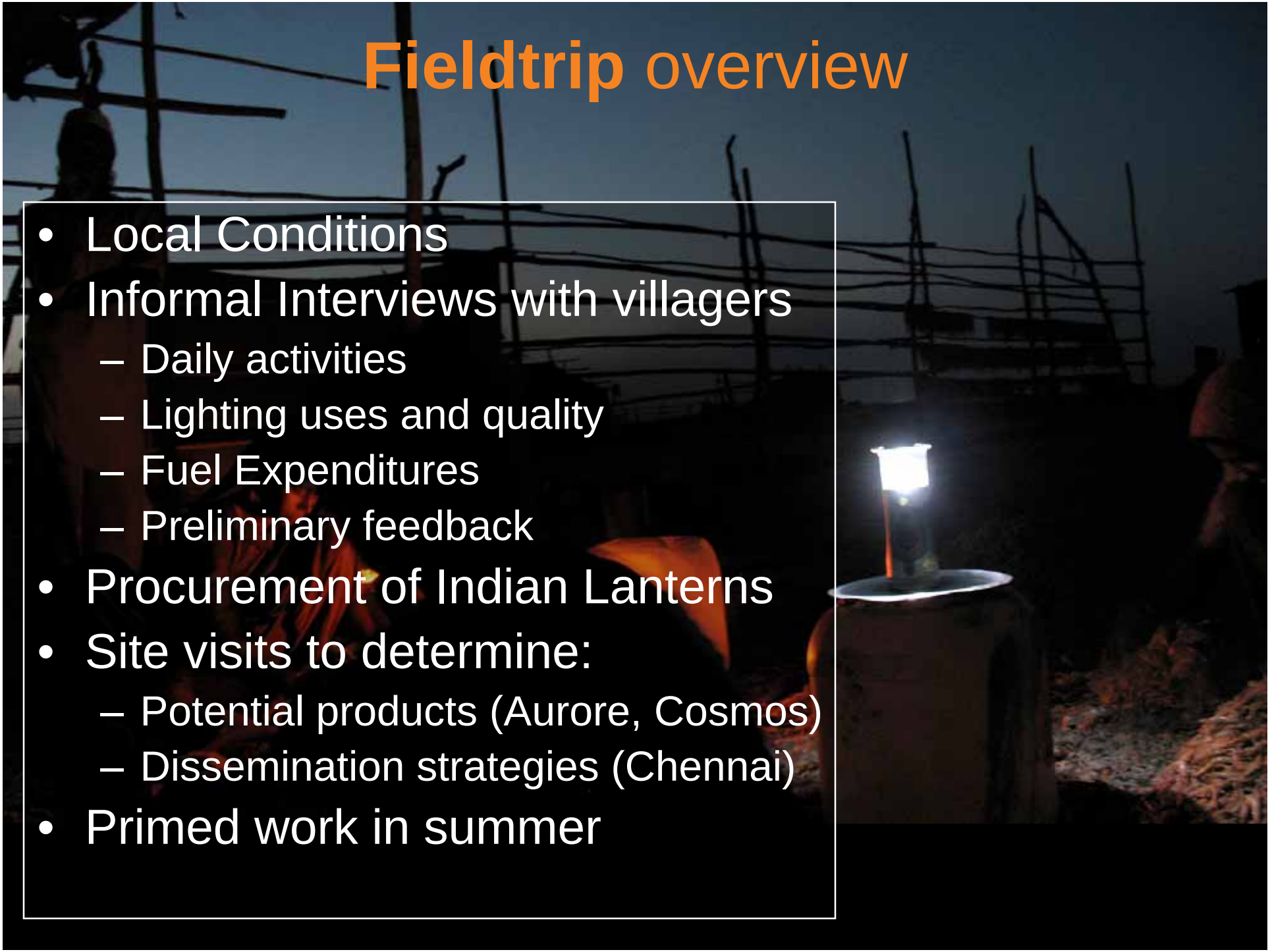
- Everyone needs light
- More than a billion people don’t have access to electrical lighting
- Fuel based lighting
  - Expensive
  - Inefficient
  - Unsafe
  - Harmful to health
- Paucity of modern lighting products for this market

Goals and **Tasks**

- Identify lighting needs
- Identify and test existing lighting products
- Determine which products meet the needs
- Recommendations for product improvement
- Develop innovative business and distribution models

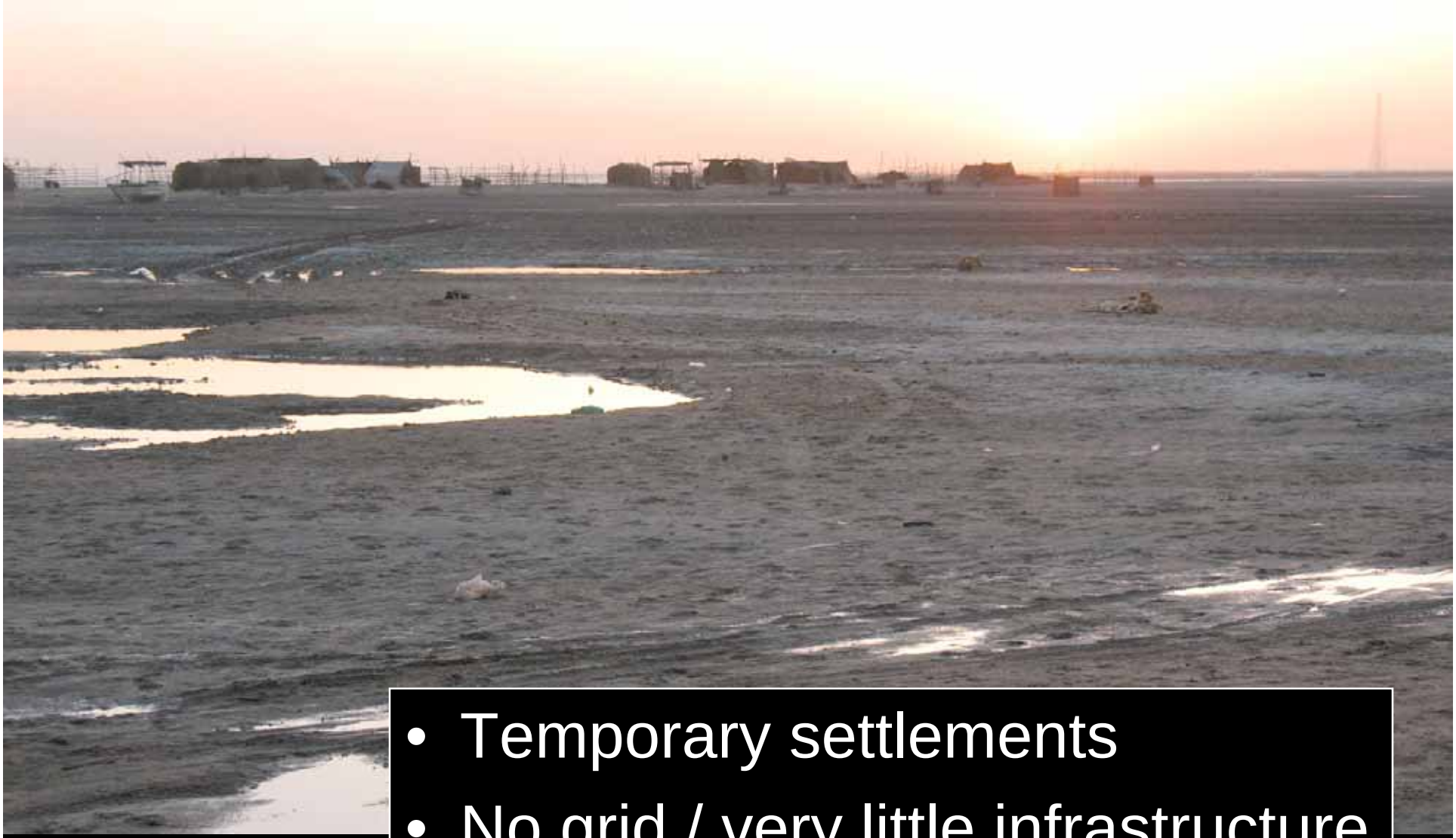
http://content.answers.com

Fieldtrip overview



- Local Conditions
- Informal Interviews with villagers
  - Daily activities
  - Lighting uses and quality
  - Fuel Expenditures
  - Preliminary feedback
- Procurement of Indian Lanterns
- Site visits to determine:
  - Potential products (Aurore, Cosmos)
  - Dissemination strategies (Chennai)
- Primed work in summer

Local Conditions

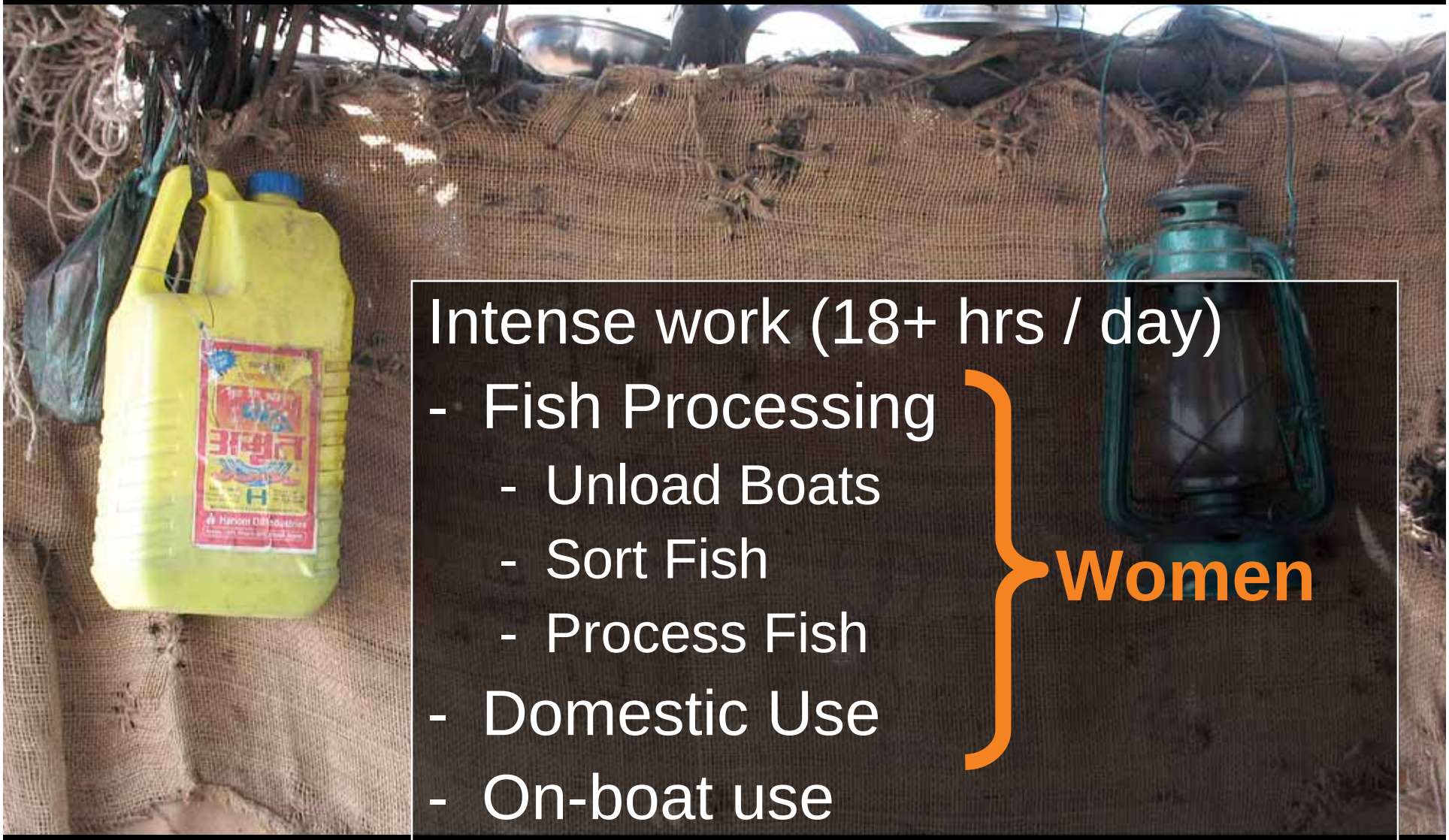


- Temporary settlements
- No grid / very little infrastructure

Community Background

- Catch, sort, process and sell fish
- Heavily indebted to middlemen
- **150%** Interest!
- High kerosene use

Lighting Uses



Intense work (18+ hrs / day)

- Fish Processing
  - Unload Boats
  - Sort Fish
  - Process Fish
- Domestic Use
- On-boat use
- Walking at night

Women

Fish Sorting

Design Criteria

Interviews suggest:

- Convenience
- Ruggedness
- Portability
- Affordability
- Flexibility

“Snap In”

Existing Lamps in Kutch

"Hurricane"

www.wikipedia.org

"Petromax"

"Chimney"

Current Cost of Lighting

Kerosene Lantern

Consumption ≈ 20 L/month
Cost = Rs. 20 /L
Lantern cost ≈ Rs. 100
Lantern life = 1 yr
Discount rate = 150% /yr

Cost of lighting ≈ Rs. 425 per month

Products Researched

- Flashlights
- Lanterns
- Area Lighting
- Headlamps

www.bogolight.com

www.rei.com

www. theepicenter.com

Img.shopping.com

www.arborshop.com

www.cosmosignite.com

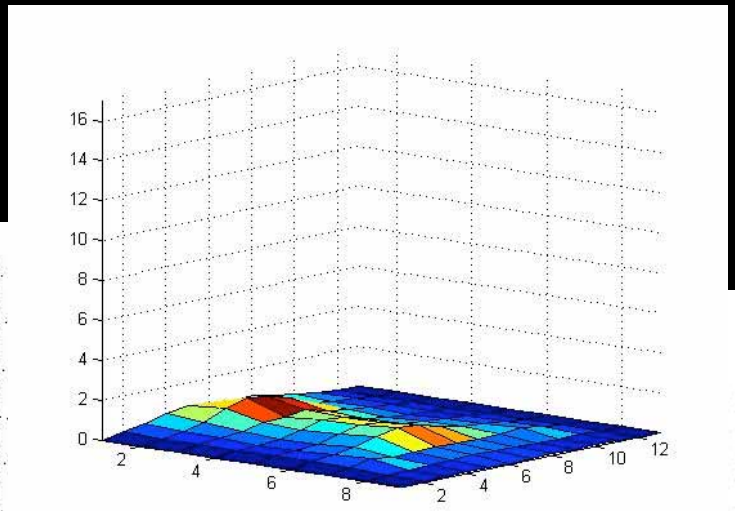
Product Analysis - Methodology

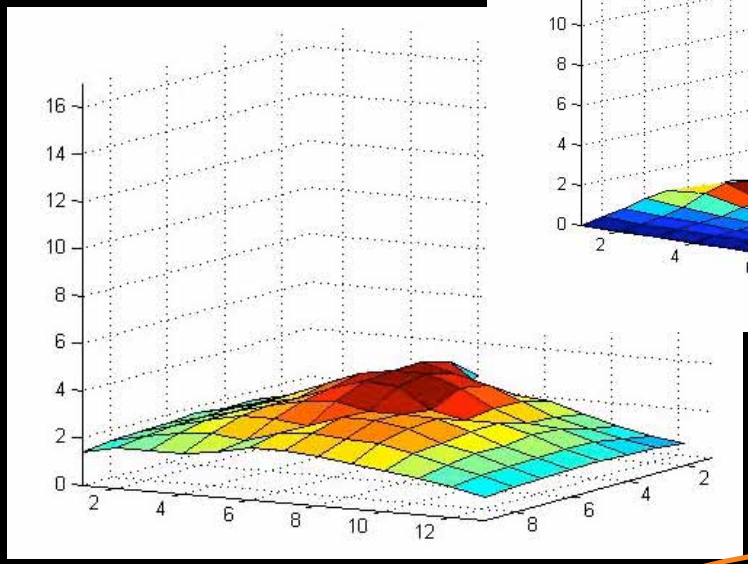
Goal: Measure the light parameters that the user cares about.

- Light Distribution: measure and plot light intensity over a surface
- Charge Time: measure charge time (tests still in progress)
- Discharge Characteristics: measure and graph light intensity while the light discharges (tests still in progress)
- Energy Efficiency: calculate light output per energy input (in progress)

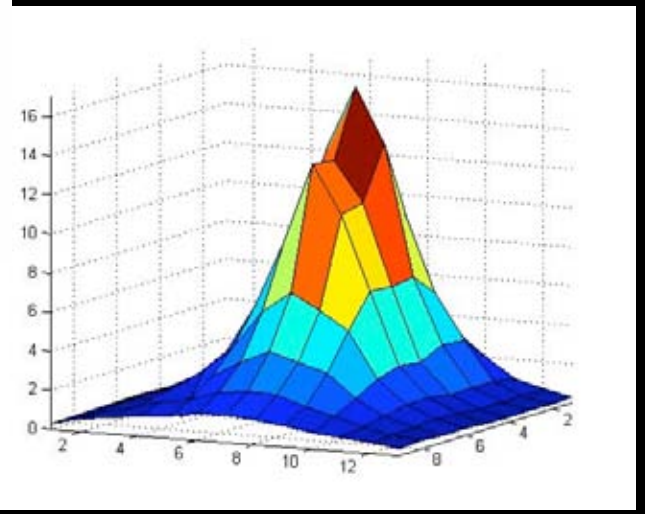
Results: Light Distribution Tests

LED Lantern: Light J





Kerosene Lantern



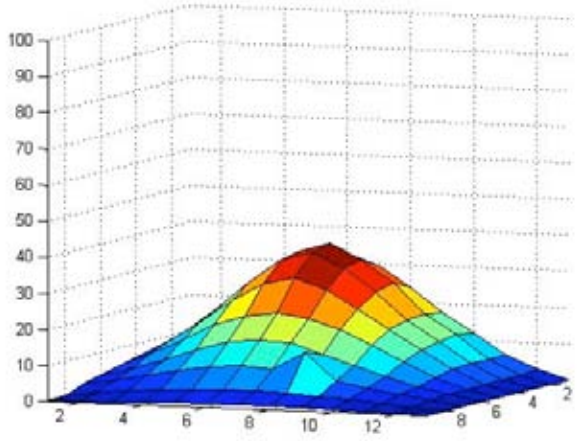
CFL Lantern: Light I

Note that the LED lantern is worse than the kerosene lantern!

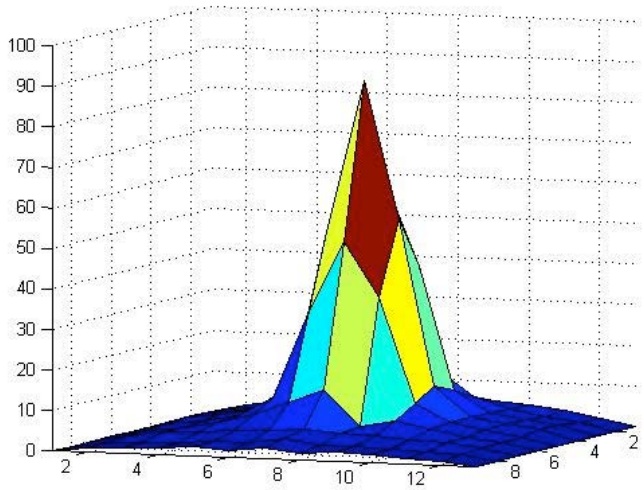
Lux plotted over a fixed surface 1m away from light source.

Results: Light Distribution Tests

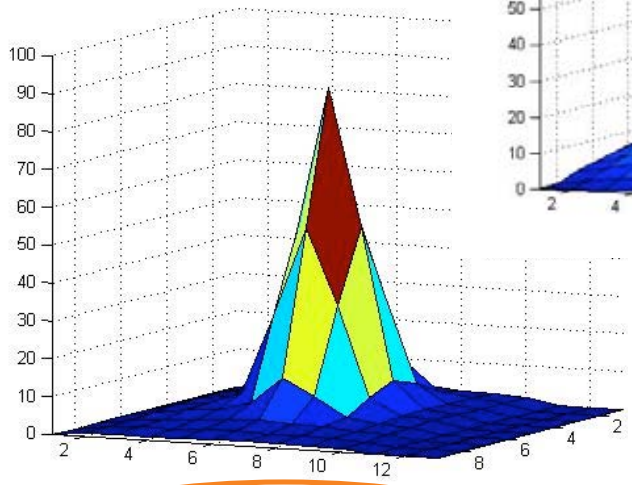
LED Flashlight E



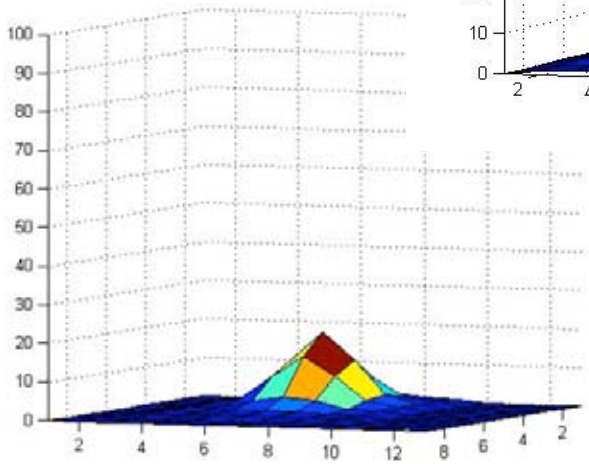
LED Flashlight C



LED Flashlight A
(purchased in USA)



Flashlights A and B appear to be same light sold to different markets!

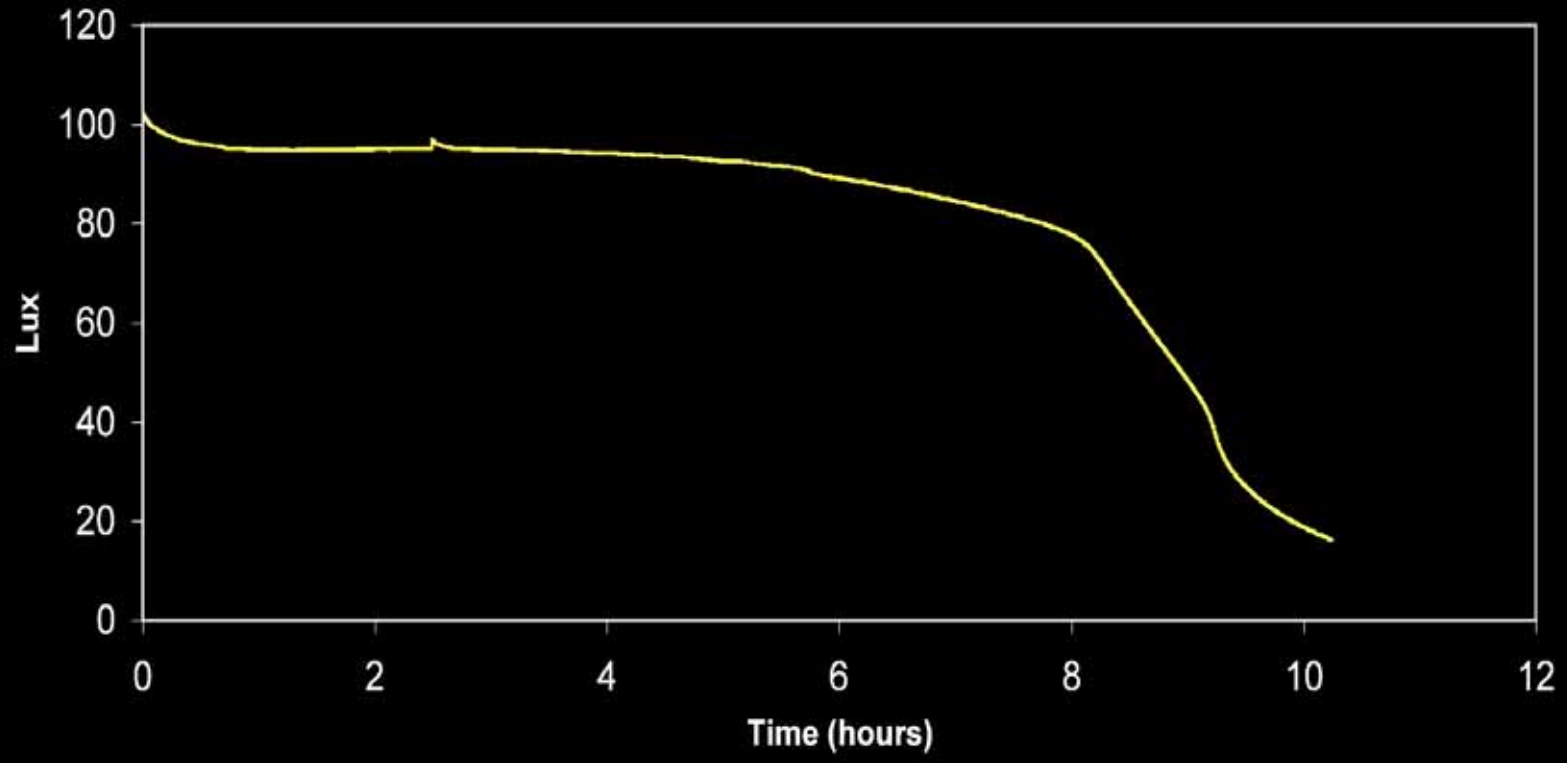


LED Flashlight B
(purchased in India)

Lux plotted over a fixed surface 1m away from light source.

Results: Preliminary Discharging Tests

LED Flashlight C



Charging

- Lighting products use rechargeable NiMH, NiCad, and lead acid; and disposable alkaline batteries

- Rechargeable batteries can be charged through solar panels or diesel generators

www.germes-online.com

bullnet.co.uk

www.ripvan100.com

www.bogolight.com

Preliminary Economic Analysis

Levelized Monthly Cost

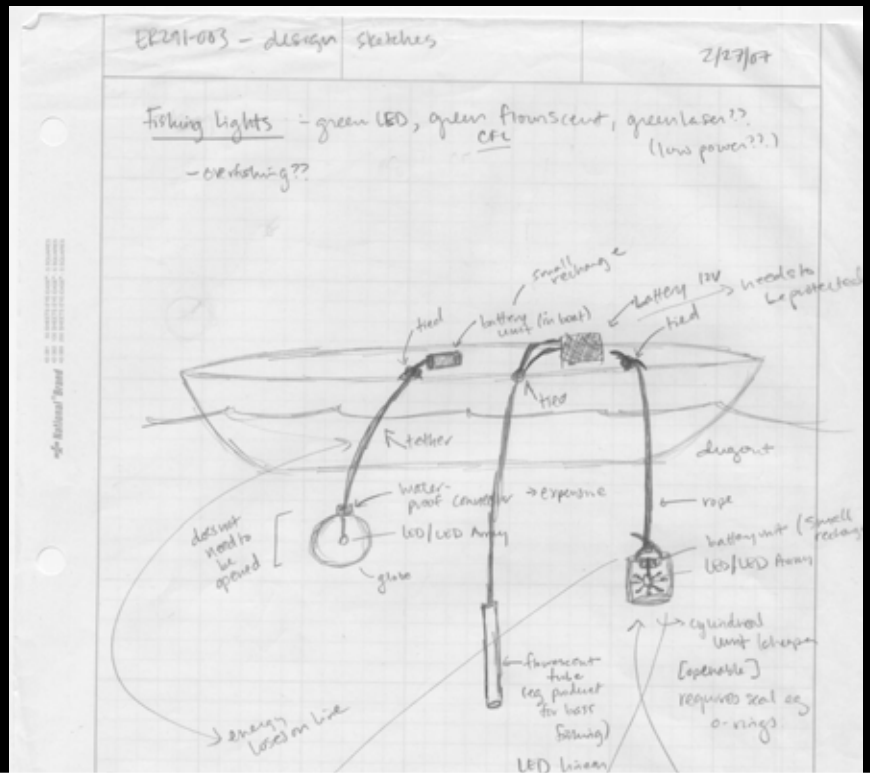
Flashlights

- Flashlight C (LED, Integrated Solar Panel)
  Rs 75 ($1.67)
- Flashlight A (LED, Disposable Batteries)
  Rs 1130 ($25.11)

Lanterns

- Light H (LED, Rechargeable Battery)
  Rs 75 ($1.67)
- Light I (CFL, Rechargeable Battery)
  Rs 66 ($1.47)

Flishlight: The ultimate in efficient-sea.™



- Built simple proof of concept fishing light
- Compared 6 green LEDs vs. 1 high brightness white LED

www.optronicsinc.com

Flishlight: The ultimate in efficient-sea.™

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Tasks accomplished

- A very thorough needs assessment
- Extensive survey of current market for off-grid lighting products and down-selection of the most suitable
- Technical characterization of 12 products
- Economic analysis
- Recommendations for products and product improvement

Next Steps/Future Teams

- This summer WTP will be identified
- Design improved lighting product based on identified needs
- Flishlight development

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