

# **PRESENTATION ON CASE STUDY OF LIGHTING IN BANDIPUR AND POKHARA**

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# Background and Objectives

- To study the present condition of the lighting schemes of the tourist destinations.
- To study the problems associated with lighting in the site and recommend the possible solution accordingly.



# Methodology

## 1. Questionnaire

- Designed considering two categories of the stake holders: Local/businessmen and Visitors/Tourists
- 3 sets of questions:
  - 1<sup>st</sup> set - general lighting technology, their choices
  - 2<sup>nd</sup> set - lighting schemes, intervention in the site
  - 3<sup>rd</sup> set – for the businessmen and local residents which incorporates the effect of lighting in their social activities and economy.



# Methodology

## 2. Observation and Measurement

- Lux Meter



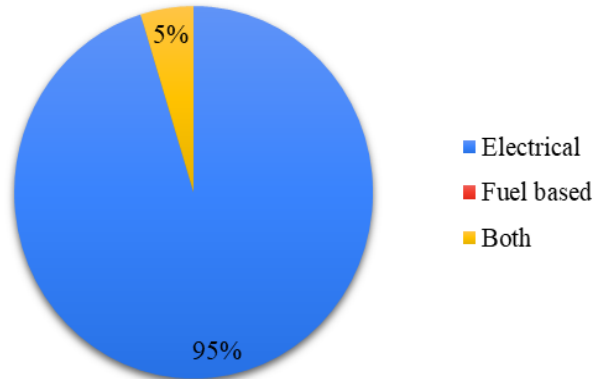
- Photos and Videos



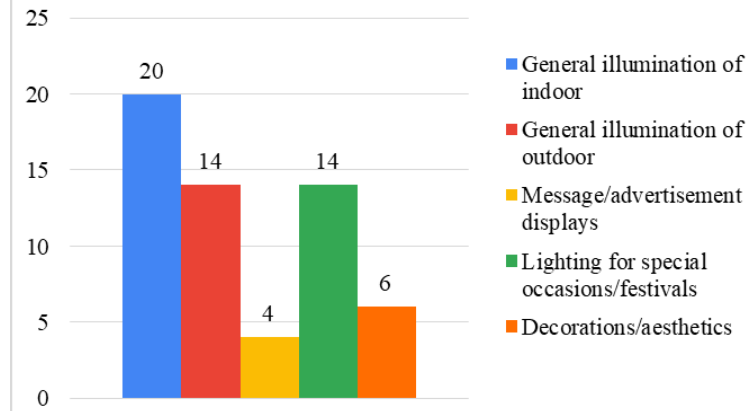
# Findings-Bandipur

- Total 20 people were interviewed: 12 were locals/businessmen and 8 were visitors.
- Response to Question Set 1

*Usage of Artificial lighting*

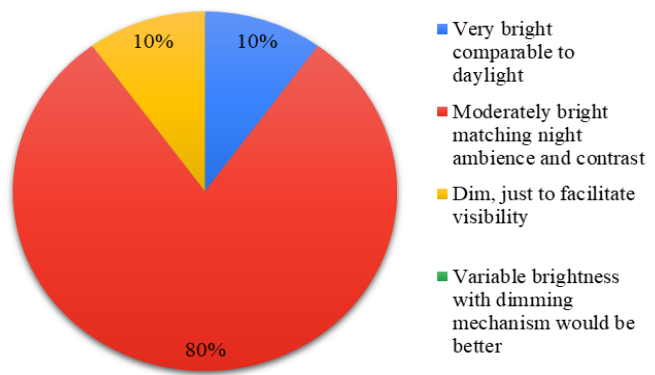


*Purpose of artificial lighting*

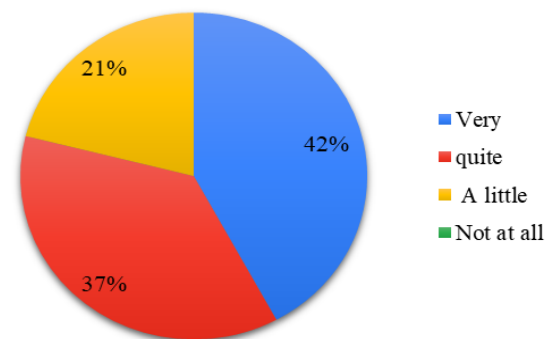


# Findings-Bandipur

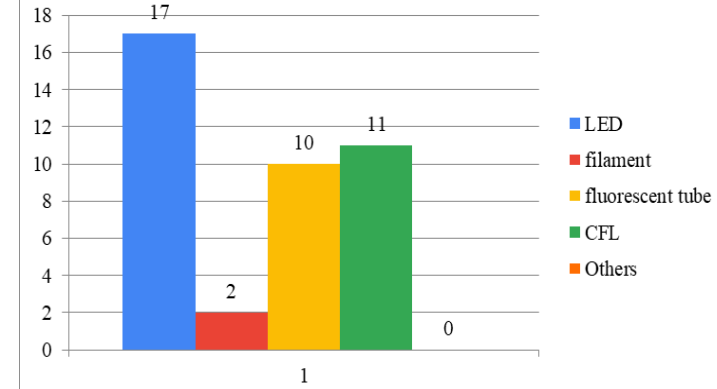
*Preferred lighting level*



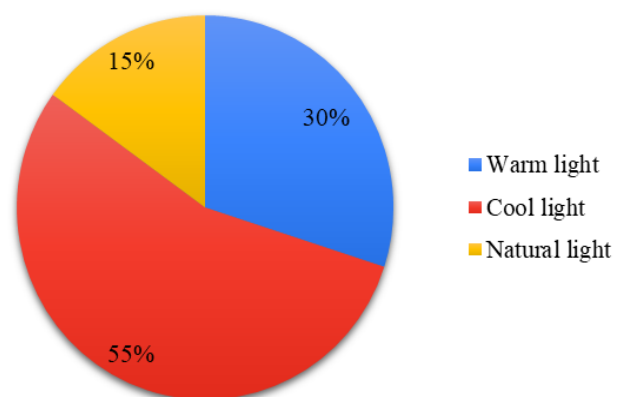
*Concern for environmental effect of lighting*



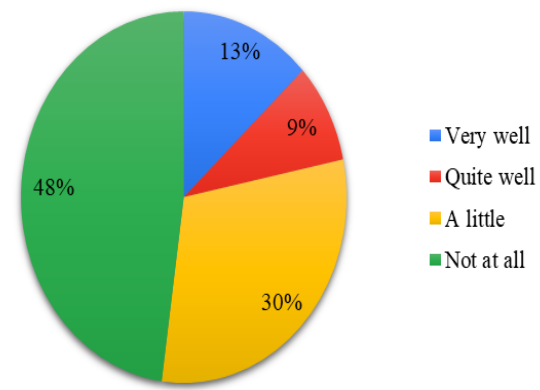
*Lighting technology*



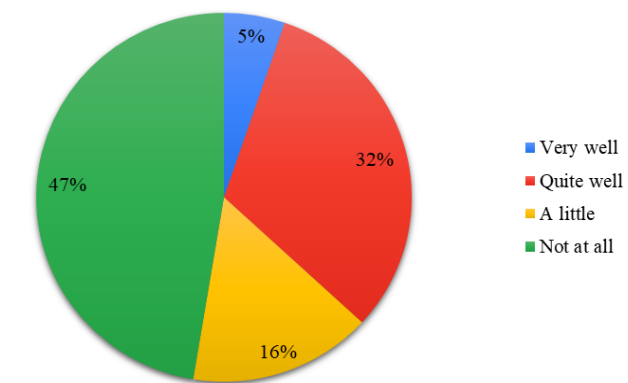
*Colour tint preference of light source*



*Awareness about lighting pollution*

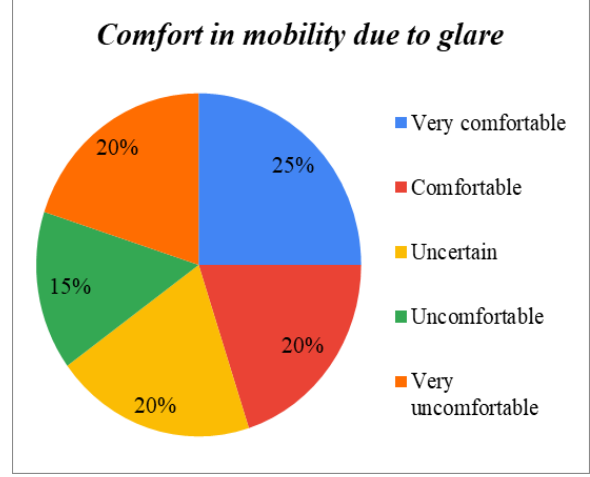
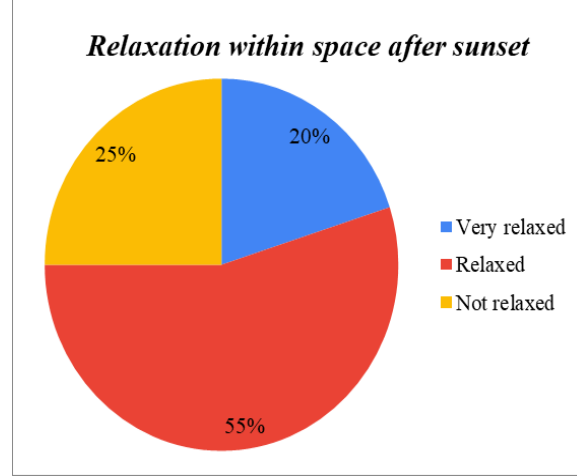
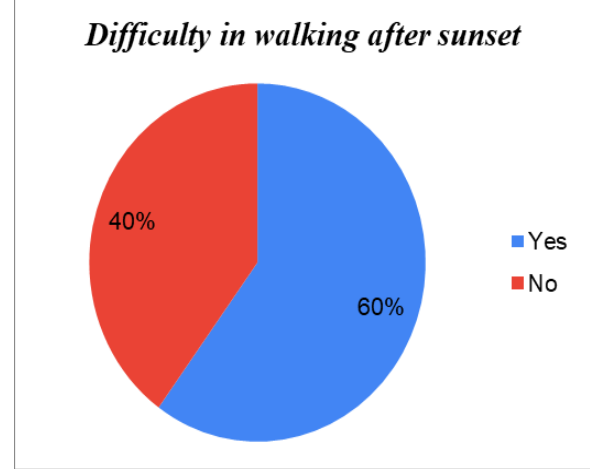
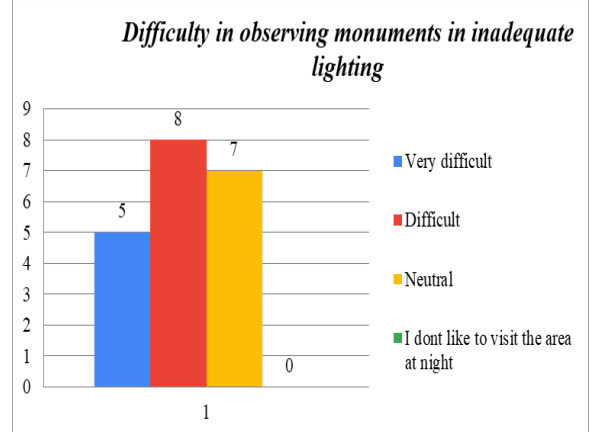
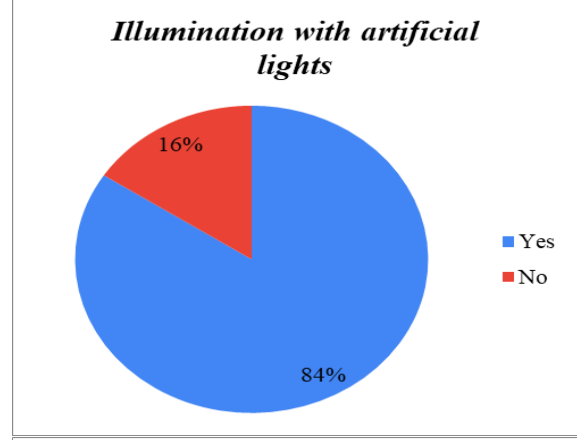
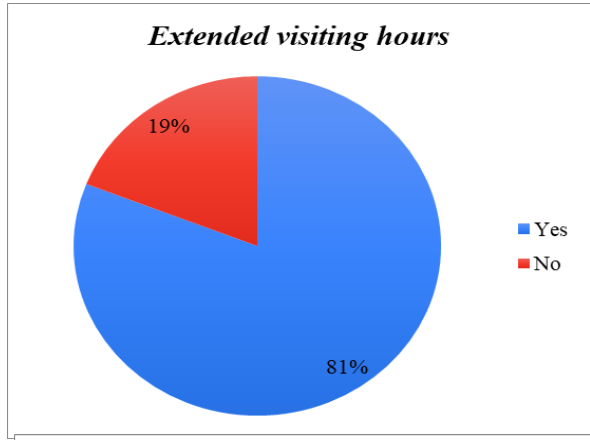


*Knowledge of energy consumption and efficient light source*

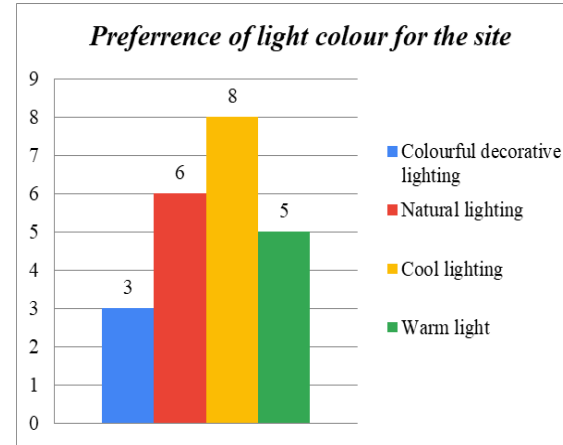
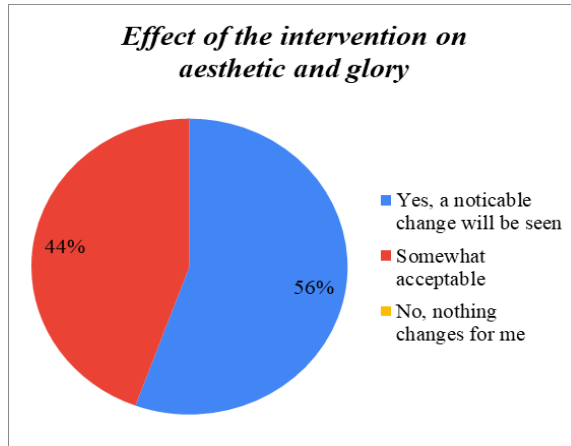


# Findings-Bandipur

## Response to Question Set 2



# Findings-Bandipur



Some responses to open questions seeking suggestions for the lighting of the tourist site as follows:

- Use of solar lights to save energy as well as add emergency lights.
  - Manage the extra wires added along with added luminaires.
  - Use of decorative or special lighting schemes during occasions.
  - Warm lighting should be used to preserve the originality.
- Decorative lights at a few points for a good photographic view.





# Findings-Bandipur

## Response to Question Set 3

- There was 100% concurrence in the opinion of all regarding the positive effect on the neighborhood due to lighting of the touristic site.
- The operating time of business peaked at 9:00 pm while few businesses were running till 11:00 pm as well.
- 64% of the businessmen were willing to extend their operating hours until late at night if there were proper lighting arrangements and decent tourist flow while 36% were happy with their current working schedule.
- 83% were confident to support the Municipality and concerned authority for the maintenance after installation, and 17% were likely to support.
- All were positive to take the responsibility for the safety of the lighting fixtures in the neighborhood.

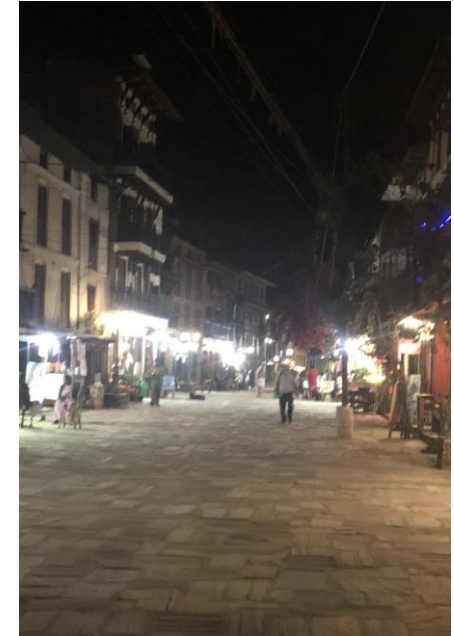


# Findings-Bandipur

Findings from the observation  
and Measurements.

## 1. Main Street

- Illuminance:
  - a.  $E_{\text{horizontal}} = 10.878 \text{ lux}$
  - b.  $E_{\text{vertical}} = 13.45 \text{ lux}$
  - c.  $E_{\text{max}} = 17.11 \text{ lux}$
- No provision for the emergency lighting
- Poor maintenance
- Mix of warm and cool light in single post.



# Findings-Bandipur

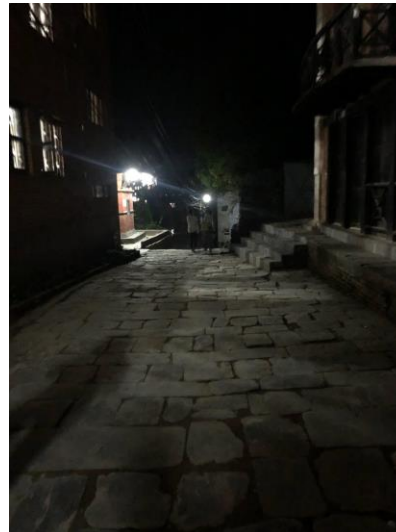
## 2. Bindabasini Mai Temple

- Illuminance:
  - a.  $E_{\text{horizontal}} = 0.43 \text{ lux}$
  - b.  $E_{\text{vertical}} = 4.9 \text{ lux}$
  - c.  $E_{\text{max}} = 4.9 \text{ lux}$



## 3. Alley to Tindhare

- Illuminance:
  - a.  $E_{\text{horizontal}} = 3.347 \text{ lux}$
  - b.  $E_{\text{vertical}} = 2.36 \text{ lux}$
  - c.  $E_{\text{max}} = 4.2 \text{ lux}$



## 4. Tindhare

- Illuminance:
  - a.  $E_{\text{horizontal}} = 1.2 \text{ lux}$
  - b.  $E_{\text{vertical}} = 0.865 \text{ lux}$
  - c.  $E_{\text{max}} = 1.67 \text{ lux}$

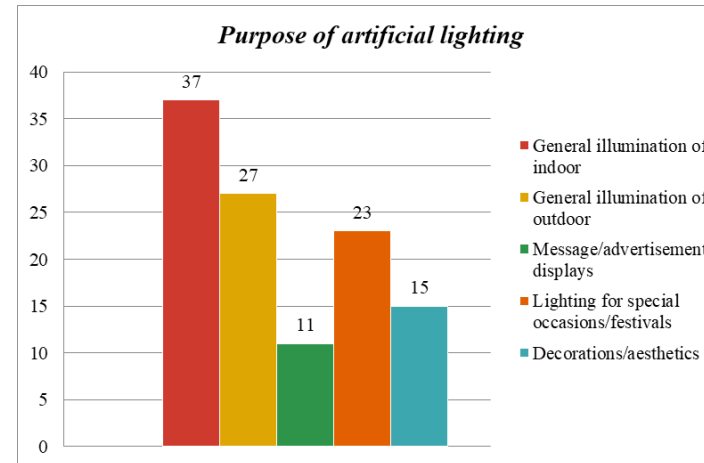
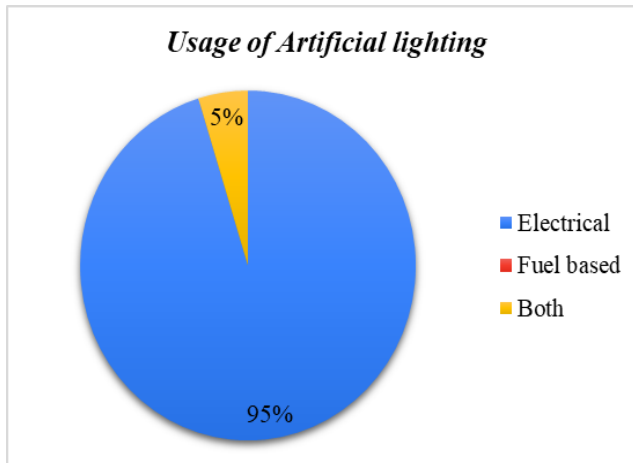




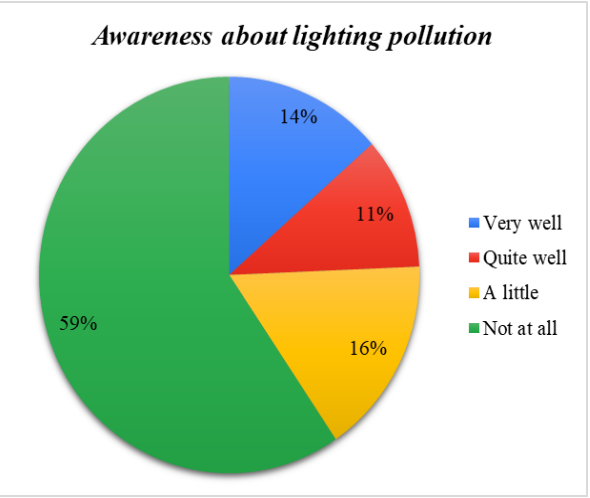
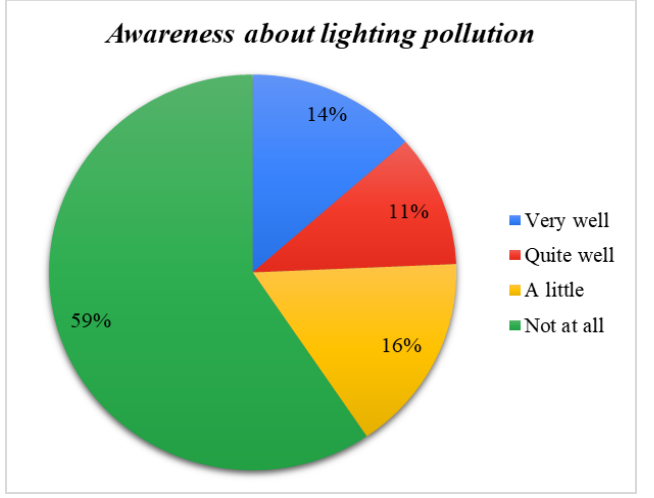
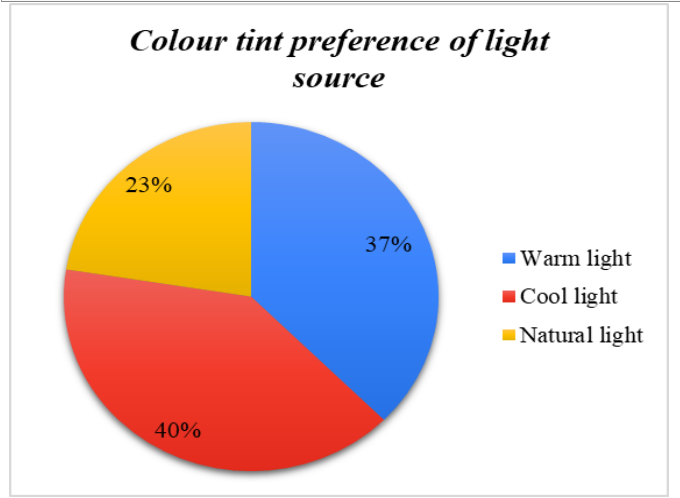
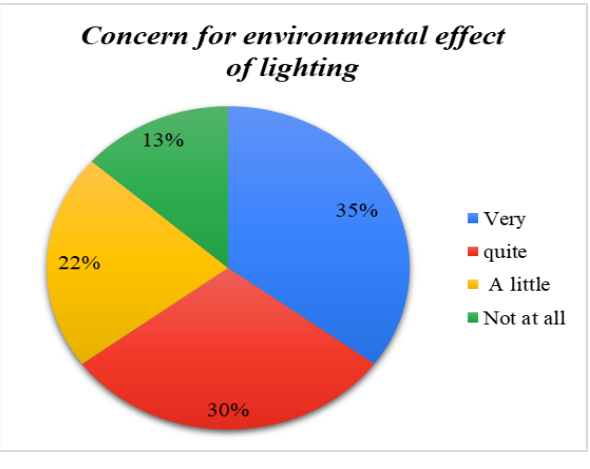
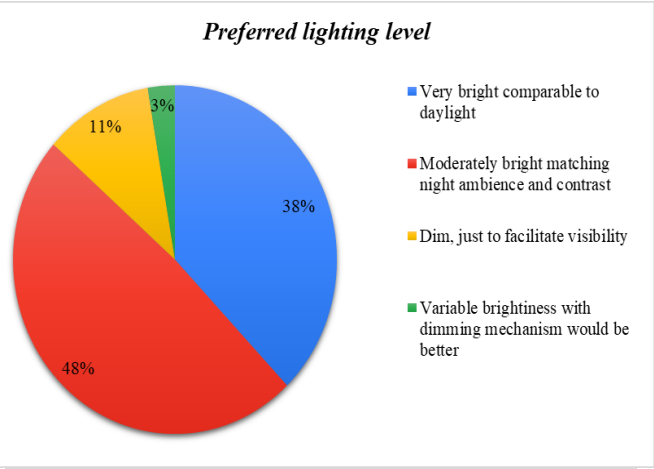
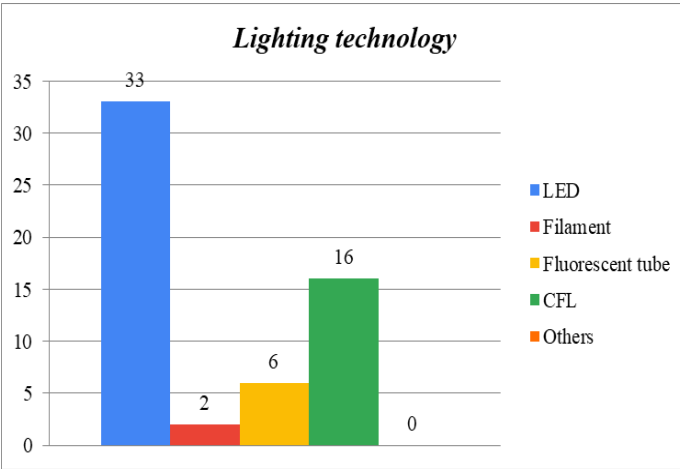
# Findings-Pokhara

- Total 37 people were interviewed: 18 were locals/businessmen and 19 were visitors.

## Response to Question Set 1

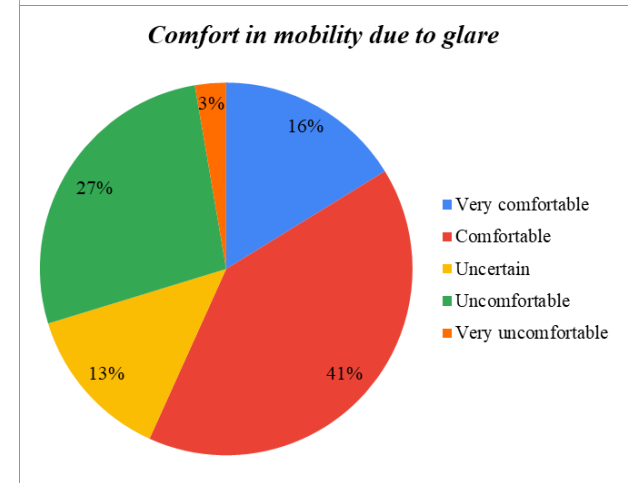
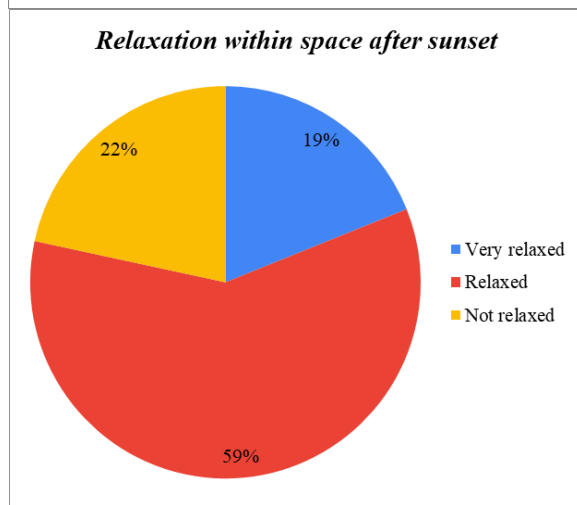
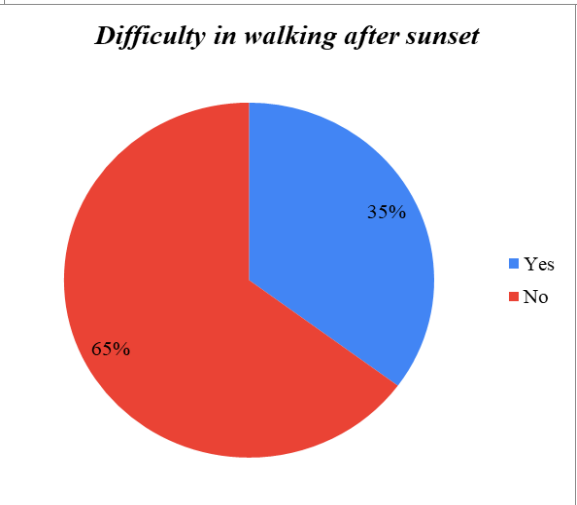
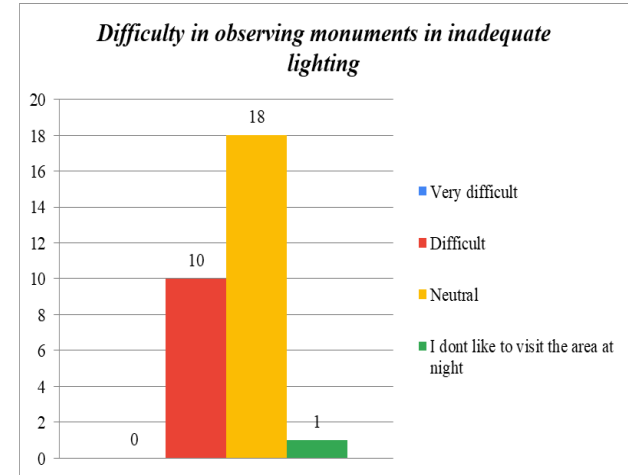
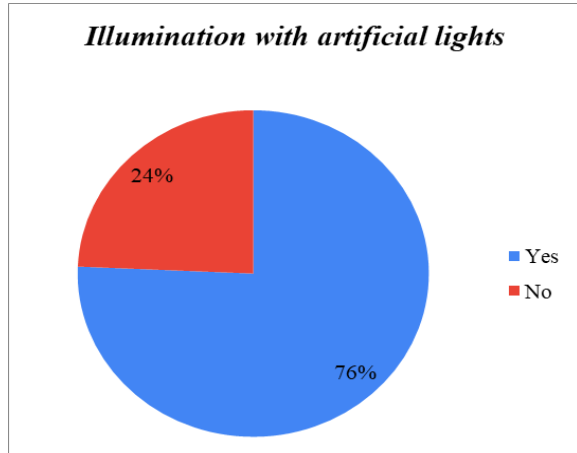
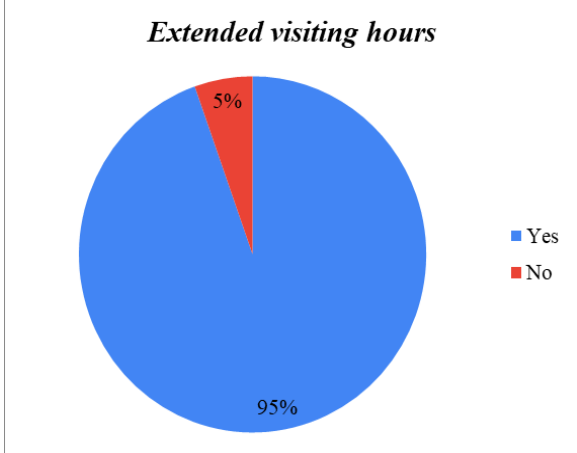


# Findings-Pokhara

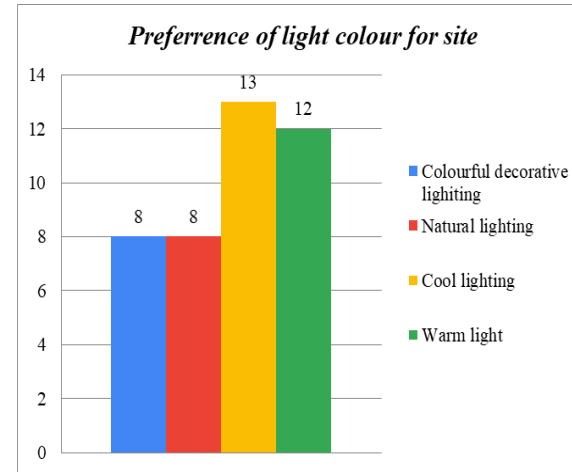
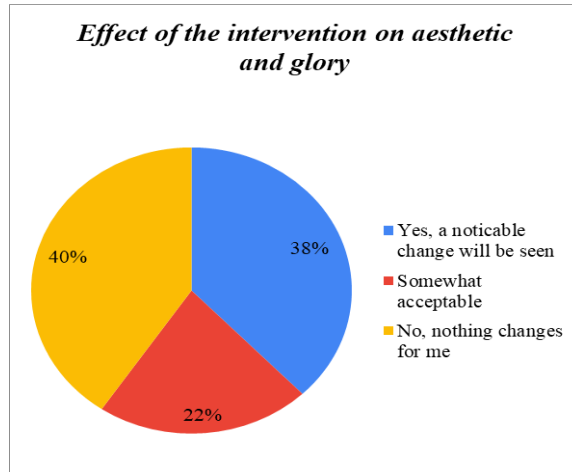


# Findings-Pokhara

## Response to Question Set 2



# Findings-Pokhara



Some responses to open questions seeking suggestions for the lighting of the tourist site as follows:

- Government should also focus on the maintenance of the installed lights.
- Proper mixture of warm and natural lighting for the site.
- Managed decorative lighting in the main street should be practiced.
- Uniformity should be managed.
- Lightning should not hamper night vision of stars at night.
- Proper mixture of different colored lights should be used.
- Glare should be reduced at places.
- There should be efficient street lighting along with emergency lighting concerning about the safety.

# Findings-Pokhara

## Response to Question Set 3

- 89% were positive about the effect on the neighborhood due to lighting of the touristic site whereas 11% disagreed saying it would make the destination lose its natural importance especially in the lake side.
- The operating time of business peaked at 10:00 pm while few businesses were open to 11:00 pm and not after that as the government prohibited after that.
- 62% of the businessmen were willing to extend their operating hours until late at night if there were proper lighting arrangements and decent tourist flow and if the government allows while 38% were happy with their current working schedule.
- Majority of locals/businesses were happy to support the Municipality and concerned authority for the maintenance after installation, and 17% were likely to support.
- All were positive to take the responsibility for the safety of the lighting fixtures in the neighborhood.





# Findings-Pokhara

Findings from the observation  
and Measurements.

## 1. Main Street:

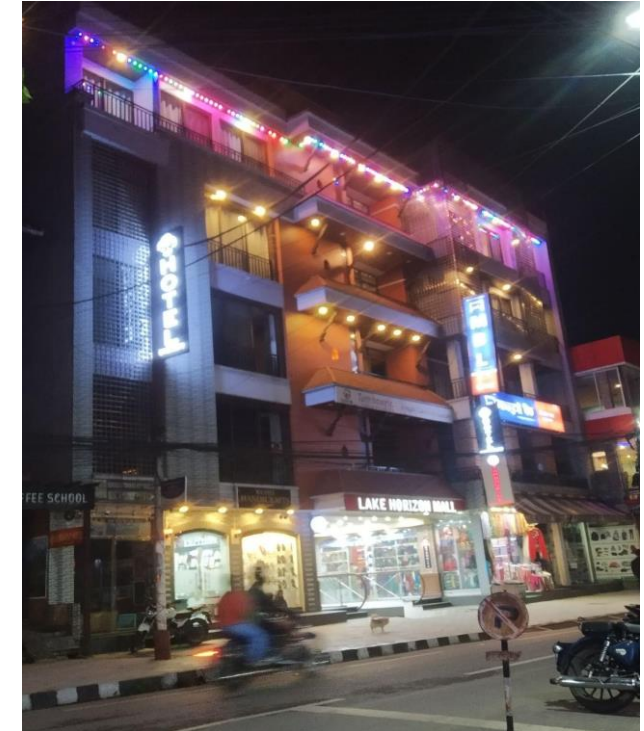
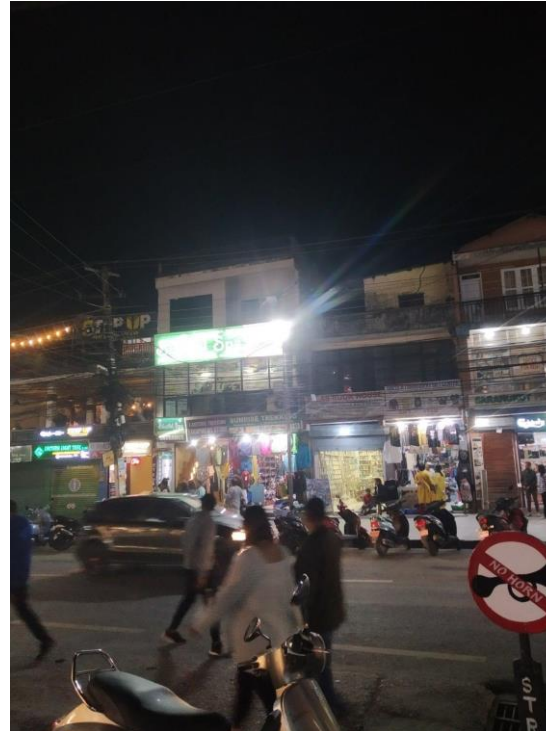
- Illuminance:

a.  $E_{\text{horizontal}} = 19 \text{ lux}$

b.  $E_{\text{vertical}} = 23.5 \text{ lux}$

c.  $E_{\text{max}} = 24.2 \text{ lux}$

- No provision for the emergency lighting
- No proper maintenance
- Not enough light in the main road after the shutdown of all shops and local business during night time.



# Findings-Pokhara

## 2. Lake Side

- Illuminance:
  - a.  $E_{\text{horizontal}} = 14.3 \text{ lux}$
  - b.  $E_{\text{vertical}} = 13 \text{ lux}$
  - c.  $E_{\text{max}} = 13.2 \text{ lux}$

Street lights were placed at gaps of 25 to 30m.

Very Poor maintenance

Uncomfortable feeling due to  
extravagant lights



## 3. Street 17

- Illuminance:
  - a.  $E_{\text{horizontal}} = 9.3 \text{ lux}$
  - b.  $E_{text{vertical}} = 8.7 \text{ lux}$
  - c.  $E_{\text{max}} = 9.1 \text{ lux}$



# Findings-Pokhara

## 4. Street to lake side from Hallanchwok

- Illuminance:
  - a.  $E_{\text{horizontal}} = 8.9 \text{ lux}$
  - b.  $E_{\text{vertical}} = 8.1 \text{ lux}$
  - c.  $E_{\text{max}} = 8.4 \text{ lux}$
- Poor maintenance
- Not enough light after the shutdown of all shops and local business during night time.
- Very poor lighting



## 5. Disney land

- Illuminance:
  - a.  $E_{\text{horizontal}} = 15.8 \text{ lux}$
  - b.  $E_{text{vertical}} = 19.2 \text{ lux}$
  - c.  $E_{\text{max}} = 19.1 \text{ lux}$

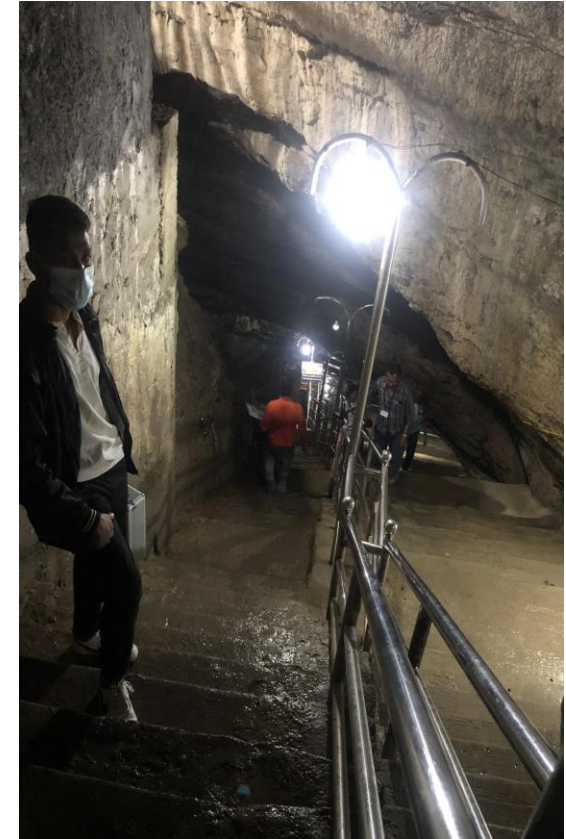




# Findings-Pokhara

## 6. Gupteswor Gufa

- Illuminance:
  - a.  $E_{\text{horizontal}} = 15.6 \text{ lux}$
  - b.  $E_{\text{vertical}} = 17 \text{ lux}$
  - c.  $E_{\text{max}} = 17 \text{ lux}$
- Site was moist and water was dripping.
- Cool LED light bulbs were used.
- Wiring was unmanaged leading to risk of short circuit, 220 V ac system was used.
- Mounting height of the lighting fixtures was low.
- Lighting installations produced glare at a lot of points disturbing the visibility.
- Poor maintenance was seen as few bulbs were flickering.



# Recommendations

## ➤ Bandipur

- Unmanaged wiring degrading the scene shall be made underground. Local government shall take the initiative
- Some sort of lighting schemes shall be followed so that there will be uniformity in lighting distribution.
- For the timely and proper maintenance of the lights, team shall be developed in collaborations of the local government and the locals themselves.
- For the temples and other heritages specialized lighting schemes need to be implemented.
- Solar lights shall be installed at certain intervals so that it can act as the back up lights when there is cut off in NEA line.
- Not only the main street but other neighbors area shall also be illuminated like way to the main street, tindhare which carries the cultural and historic importance. This will help attract the tourist to those areas.



# Recommendations

## ➤ Pokhara

- To avoid the improper lighting by the local businesses there should be regulations regarding the lighting so that the natural environment at lake side would not be disturbed.
- Not only installation but maintenance shall also be taken care by the local authorities.
- Street lighting should be done with adequate span and durable LED lamps of enough brightness.
- Enough public lights shall be provided so that haphazard light installation by the locals can be controlled.
- Waterproof (IP65 or above) lights should be used at places such as cave where problem of water dripping is prevalent.
- Warm lights and spotlights shall be used where the stone's gradient can be observed.
- Caves should be illuminated with low illuminance (low brightness) lights.





