CHOKE POINT

The Competition Between Water, Food and Energy

circle of blue

Wilson Center

CHOKE POINT

U.S.

China

Inner Mongolia

CHOKE POINT

Australia

CHOKE POINT

Mexico

CHOKE POINT INDEX

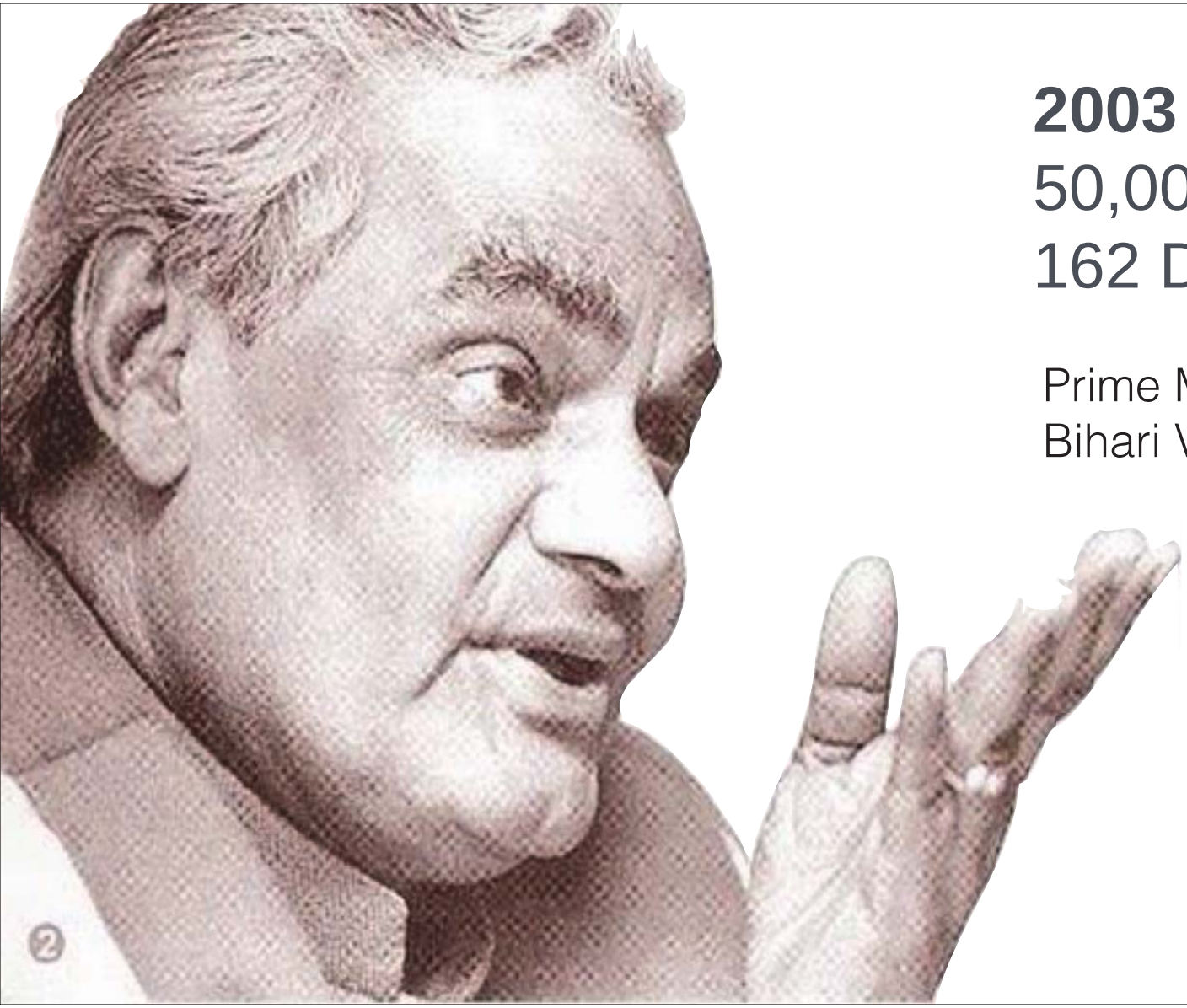
California
Great Lakes
Ogallala Aquifer

CHOKE POINT INDIA

The Competition Between Water, Food, and Energy

circle of blue

Wilson Center
CHINA ENVIRONMENT FORUM



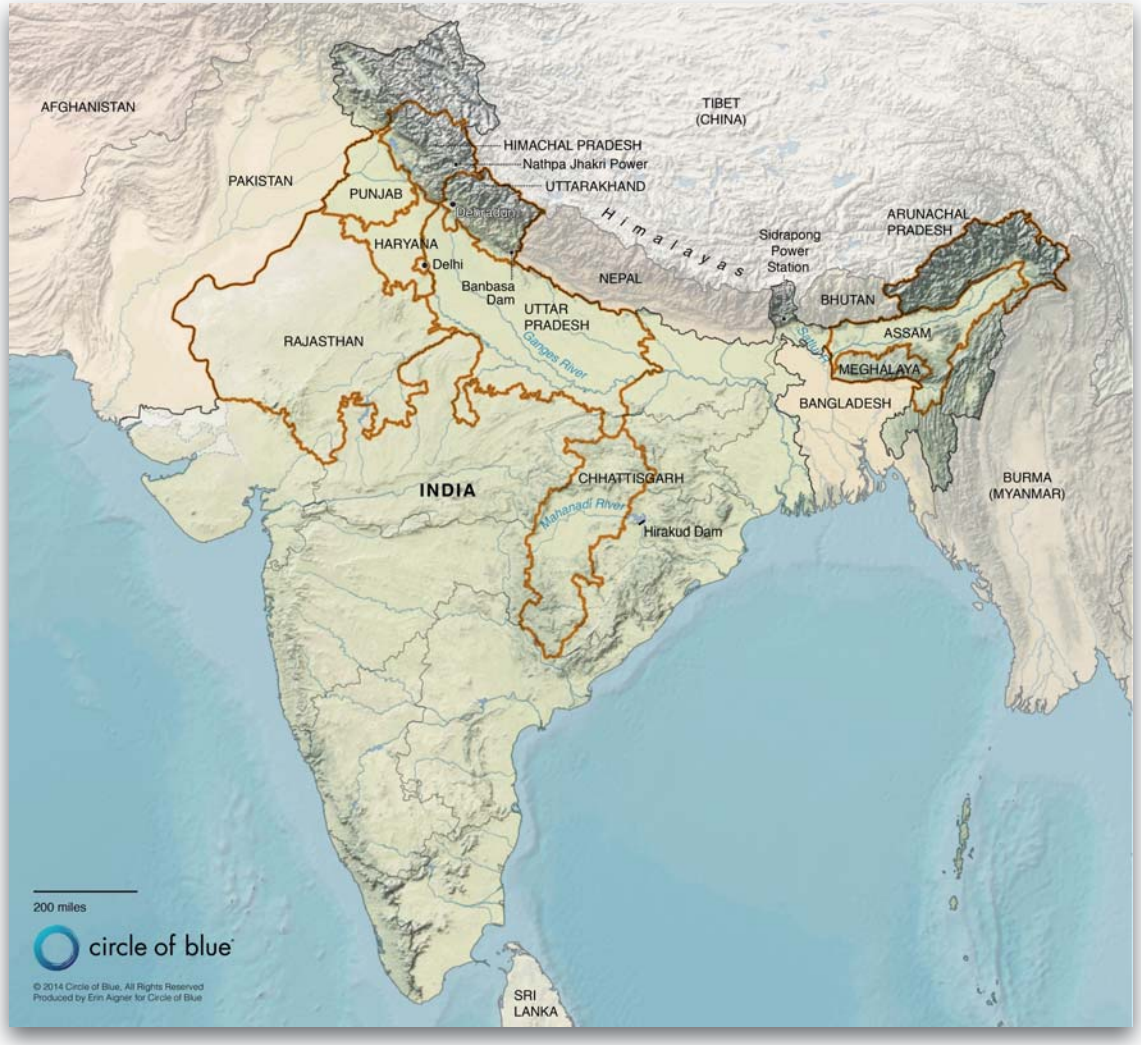
2003 Electricity Act

50,000 Megawatts

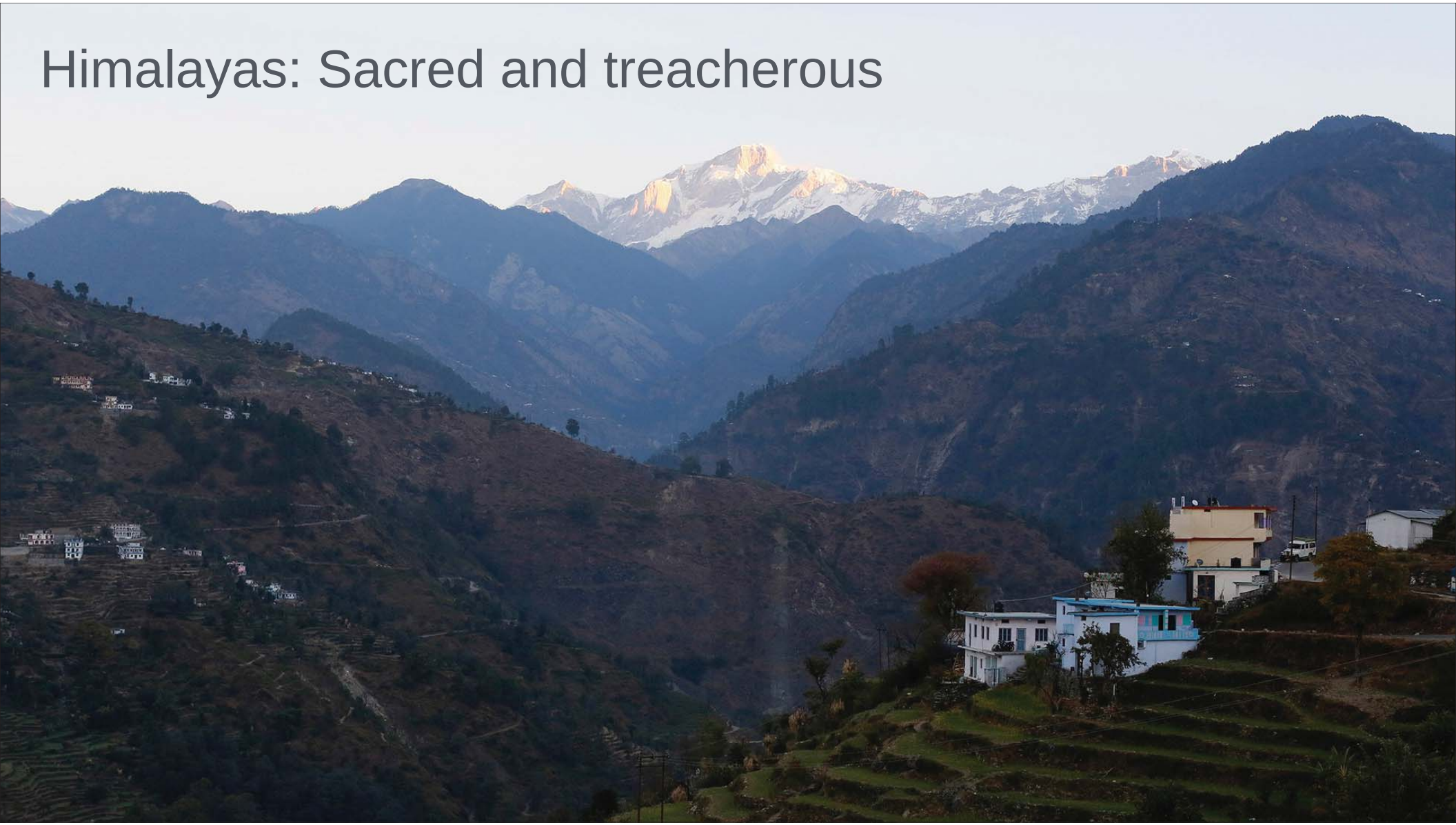
162 Dams

Prime Minister Atal Bihari Vajpayee

40,000 megawatts
113 dams in Himalayas


AFGHANISTAN
TIBET
(CHINA)
HIMACHAL PRADESH
Nathpa Jhakri Power
UTTARAKHAND
PAKISTAN
PUNJAB
Dehradun
Himalayas
ARUNACHAL
PRADESH
Sidrapong
Power
Station
HARYANA
Delhi
NEPAL
Banbasa
Dam
BHUTAN
UTTAR
PRADESH
ASSAM
RAJASTHAN
Ganges River
Satluj
MEGHALAYA
BANGLADESH
CHHATTISGARH
INDIA
BURMA
(MYANMAR)
Mahanadi River
Hirakud Dam
200 miles
circle of blue
© 2014 Circle of Blue, All Rights Reserved
Produced by Erin Aigner for Circle of Blue
SRI
LANKA

Himalayas: Sacred and treacherous



Kedarnath
Hindu Shrine

Perched 1200 years beneath
Himalaya snow peaks

Shrine and town in floodplain

Before the flood

After the flood

After the flood

Sonprayag destroyed

June 16 and 17, 2013

Sonprayag destroyed

June 16 and 17, 2013

85 bridges destroyed or damaged

World Bank, Asian Development Bank

9,000 km of roads damaged

World Bank, Asian Development Bank

1,000 km
destroyed

5,000 homes and buildings seriously damaged or destroyed

Hydroelectric Power Projects in the Bhagirathi and Alaknanda Basins

- Existing
- Under construction
- Proposed
- Dams most heavily damaged during June 2013 floods

GENERATING CAPACITY

1,000 MW
500 MW
100 MW
25 MW

SOURCE: South Asia Network on Dams, Rivers and People; damage reports by Keith Schneider, Circle of Blue

circle of blue

© 2014 Circle of Blue, All Rights Reserved
Produced by Erin Aigner for Circle of Blue

During a 24-hour period on June 15 and 16, 2013 a cloudburst dumped over 300 mm (12 inches) of rain on the mountains above Kedarnath and Badrinath, the headwaters of Mandakani and Alaknanda Rivers, the resulting floods took thousands of lives and caused extensive damage in the region.

On June 17, 2013 heavy rain and snow melt caused **Chorabari Lake** to burst through its banks, draining into the Mandakini river in 10 minutes.

The 1,000 megawatt **Tehri Dam,** opened in 2006, at 260 meters (855 feet) is India's tallest dam.

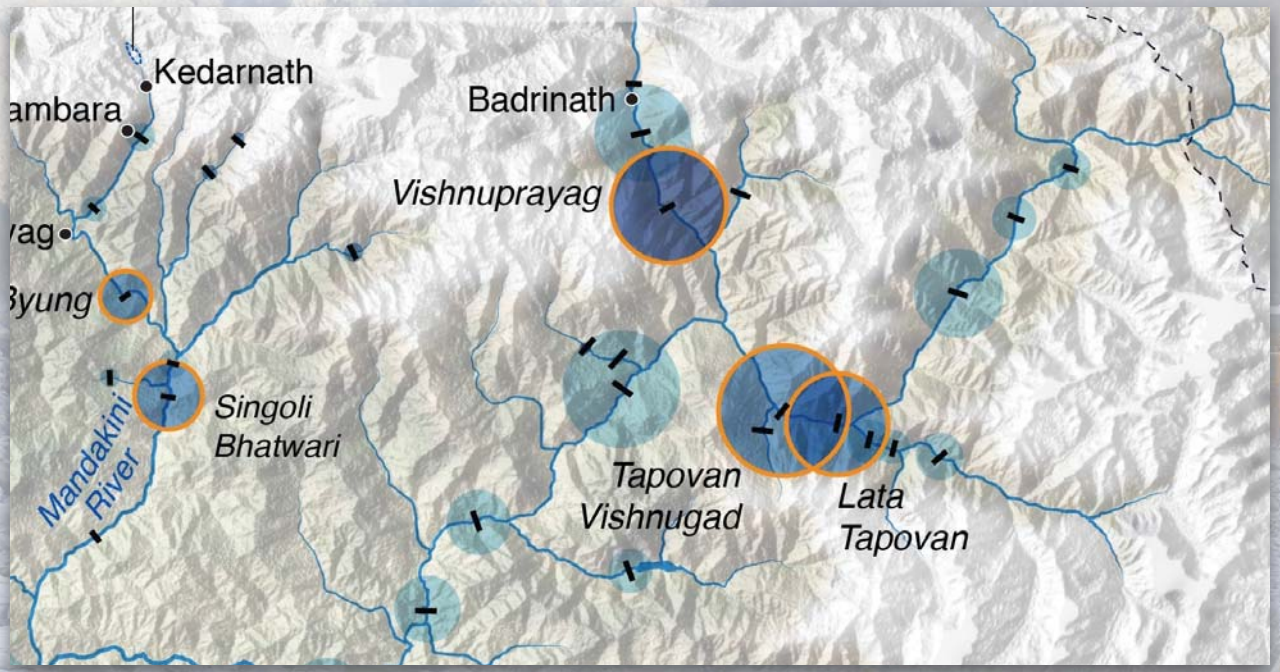
TIBET (CHINA)

Gangotri
Maneri Bhali II
Maneri Bhali I
Kedarnath
Rambara
Badrinath
Vishnuprayag
Sonprayag
Phata Byung
Singoli Bhatwari
Mandakini River
Bhagirathi River
Tehri
Koteshwar
Tapovan Vishnugad
Lata Tapovan
Alaknanda River
Srinagar
Alaknanda Hydro Power Project
Devaprayag
UTTARAKHAND
Ganges River
Pindar River

20 kilometers
20 miles

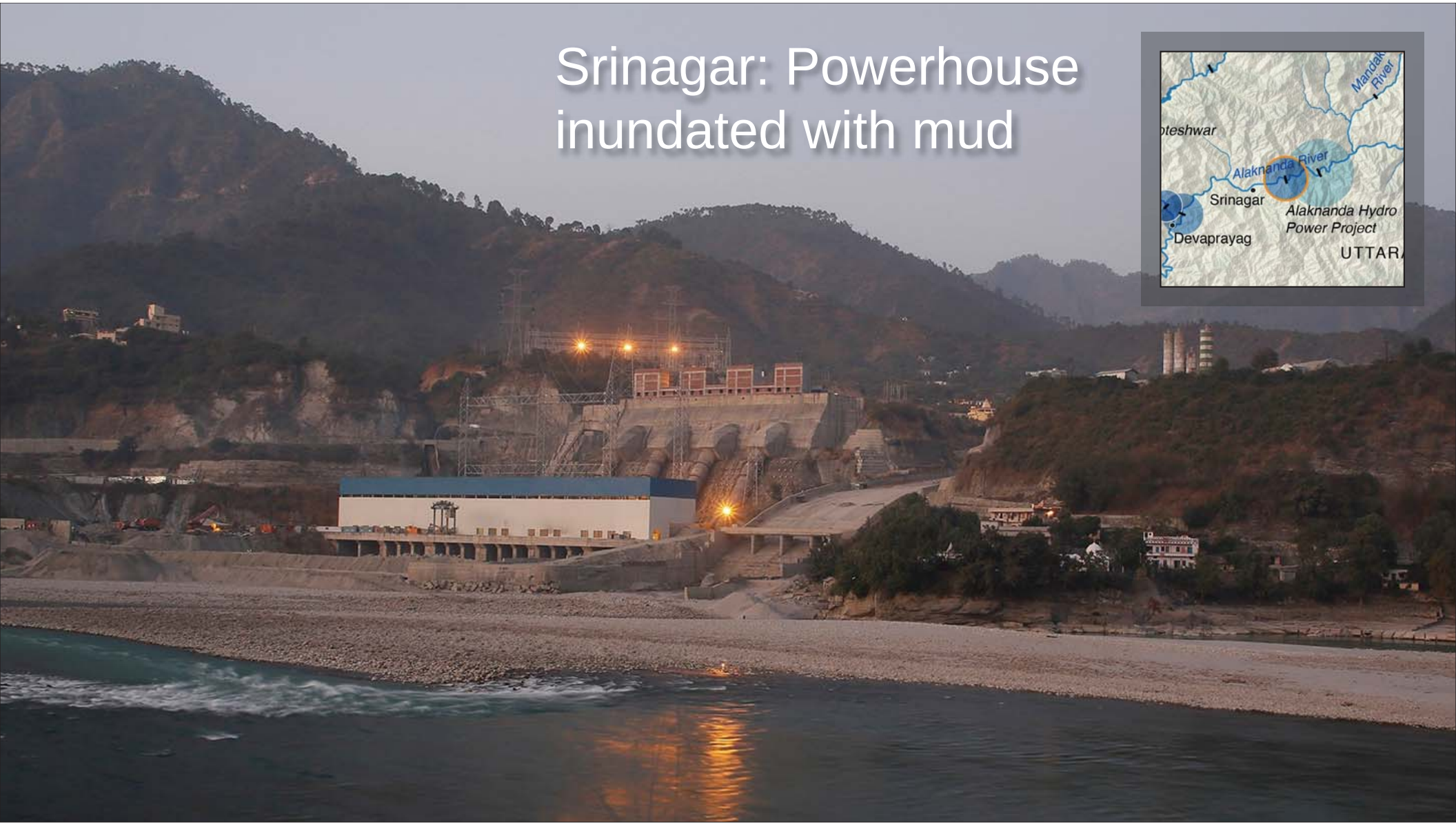
Dam ruined
at Okund

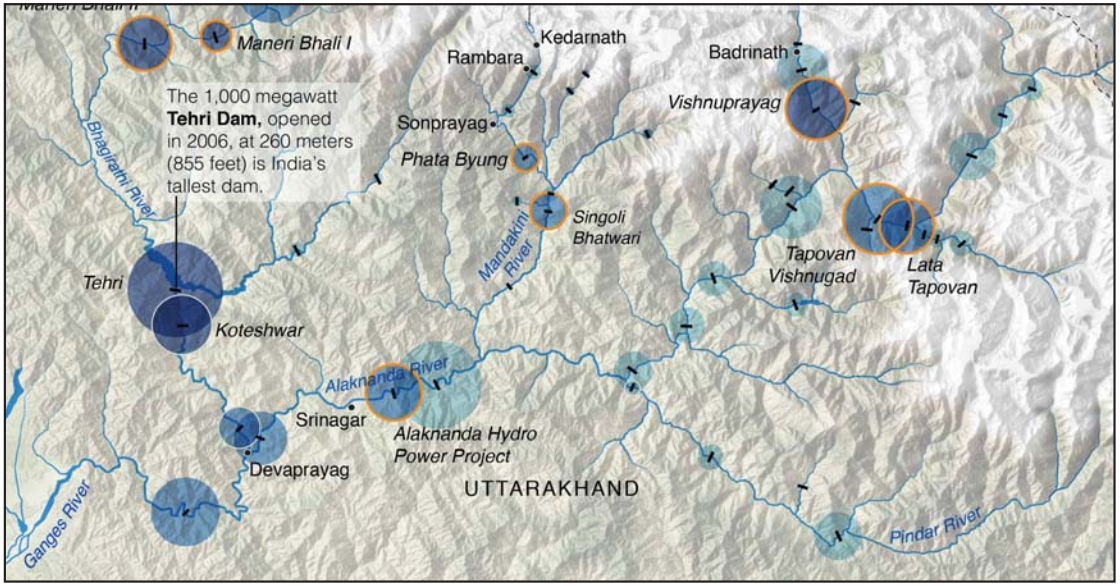
Vishnuprayag
18.06.2013 12:37


Kedarnath
ambara
Badrinath
Vishnuprayag
ag
Byung
Singoli
Bhatwari
Mandakini
River
Tapovan
Vishnugad
Lata
Tapovan

Dam washed away at Phata

Srinagar: Powerhouse inundated with mud





Uttarakhand

Center of India's hydro strategy

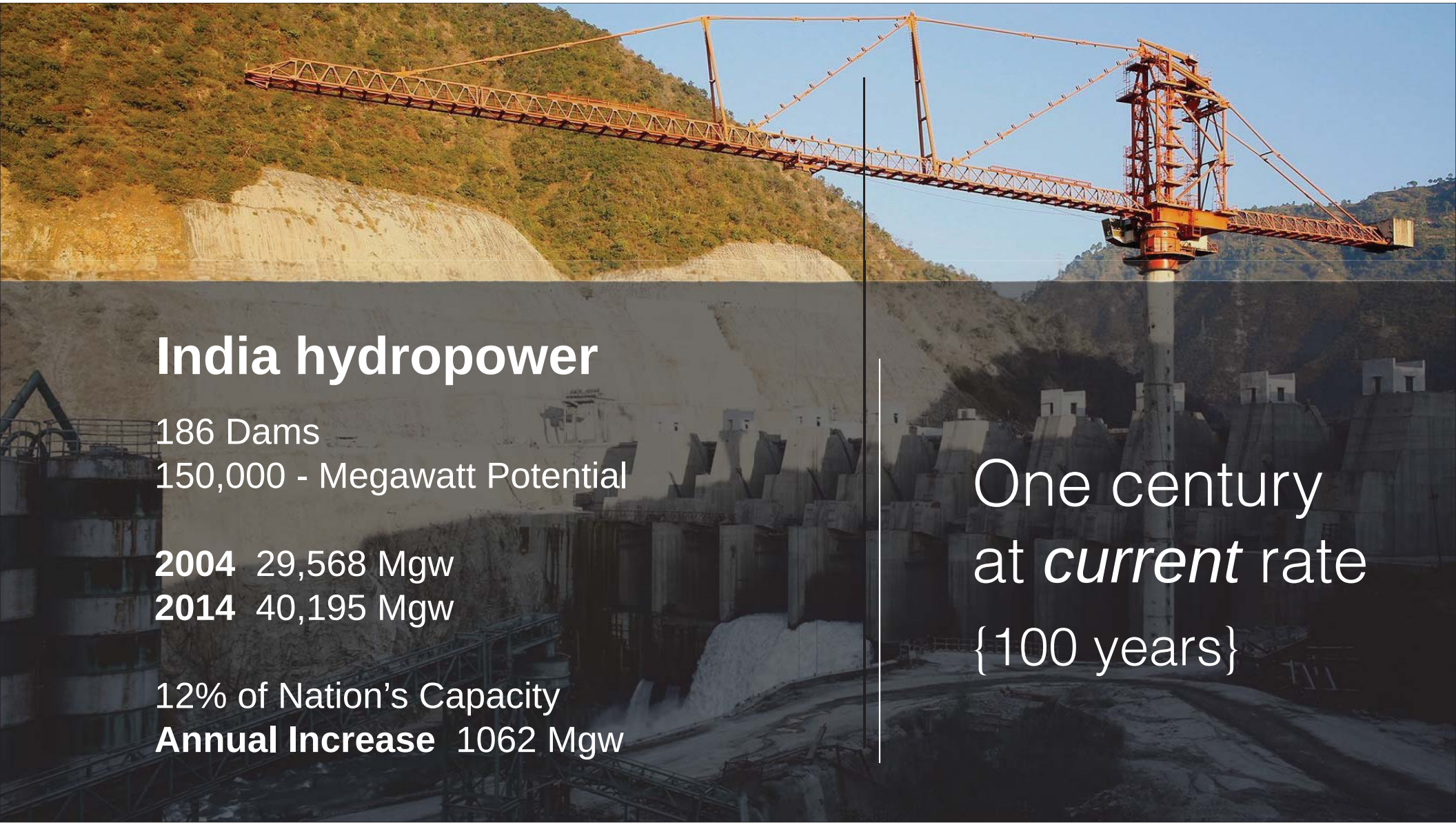
2003
33 of 162 Proposed

2006 – 2013
5 of 21 Commissioned

2006 – 2013
2384 of 7300 Megawatts
5 Dams Under Construction

2012 – 2017
24 More Proposed

Nationally 292
Dams Proposed



India hydropower

186 Dams
150,000 - Megawatt Potential

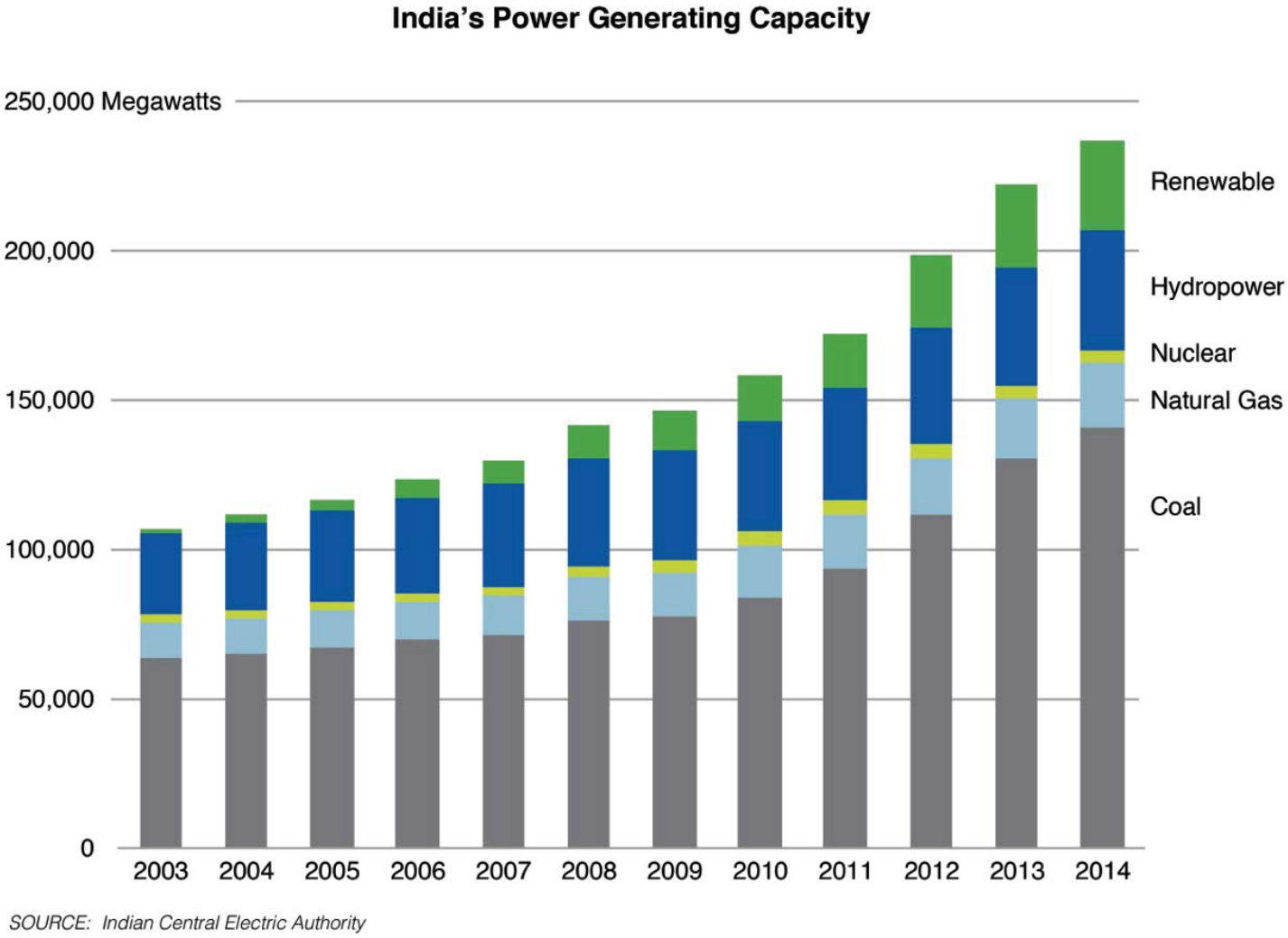
2004 29,568 Mgw
2014 40,195 Mgw

12% of Nation's Capacity
Annual Increase 1062 Mgw

One century
at *current* rate
{100 years}

More Power

	Per Capita Electric Consumption	Generating Capacity
U.S.	13,246 kwh/yr	1050 gigawatts
China	3298 kwh/yr	1150 gigawatts
India	684 kwh/yr World Bank	277 gigawatts EIA


India's Power Generating Capacity
250,000 Megawatts
200,000
150,000
100,000
50,000
0
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
Renewable
Hydropower
Nuclear
Natural Gas
Coal
SOURCE: Indian Central Electric Authority

Competition between water, food and energy

Maximum Power Principal

confronts

Law of Minimum Growth

Impediment

More mouths to feed

World Population Growth

80 Million Annually

India Population
1.27 Billion

India Growth
25 Million Annually

India’s portion of world population growth
31% Annually

Impediment

Bureaucracy

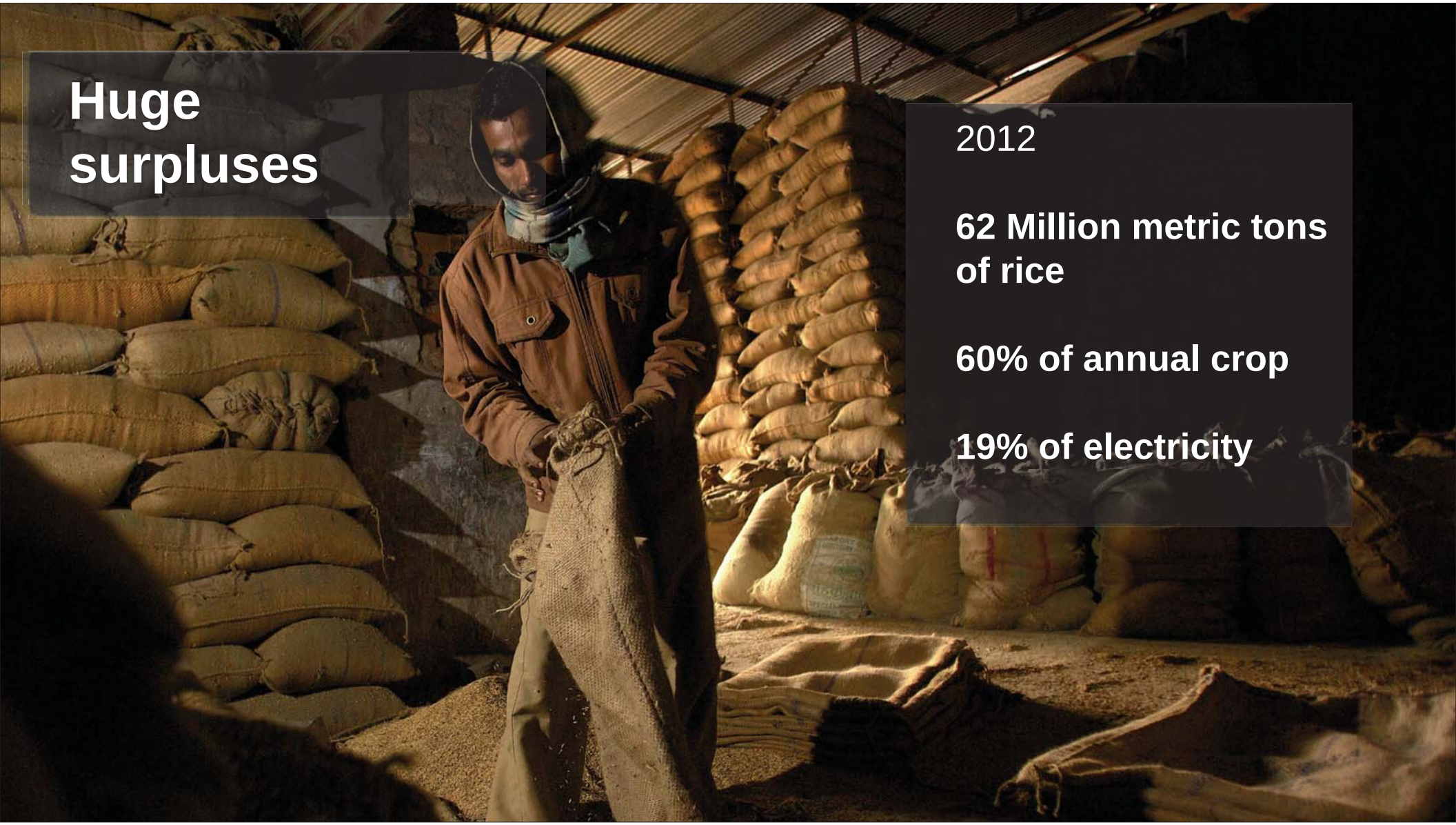
Punjab Department of Irrigation

Impediment
Corruption

Impediment

One-third of power is lost or stolen

Impediment
Free power
Free water



Huge surpluses

2012

62 Million metric tons of rice

60% of annual crop

19% of electricity

Millions of pumps

1960
3,000 Pumps

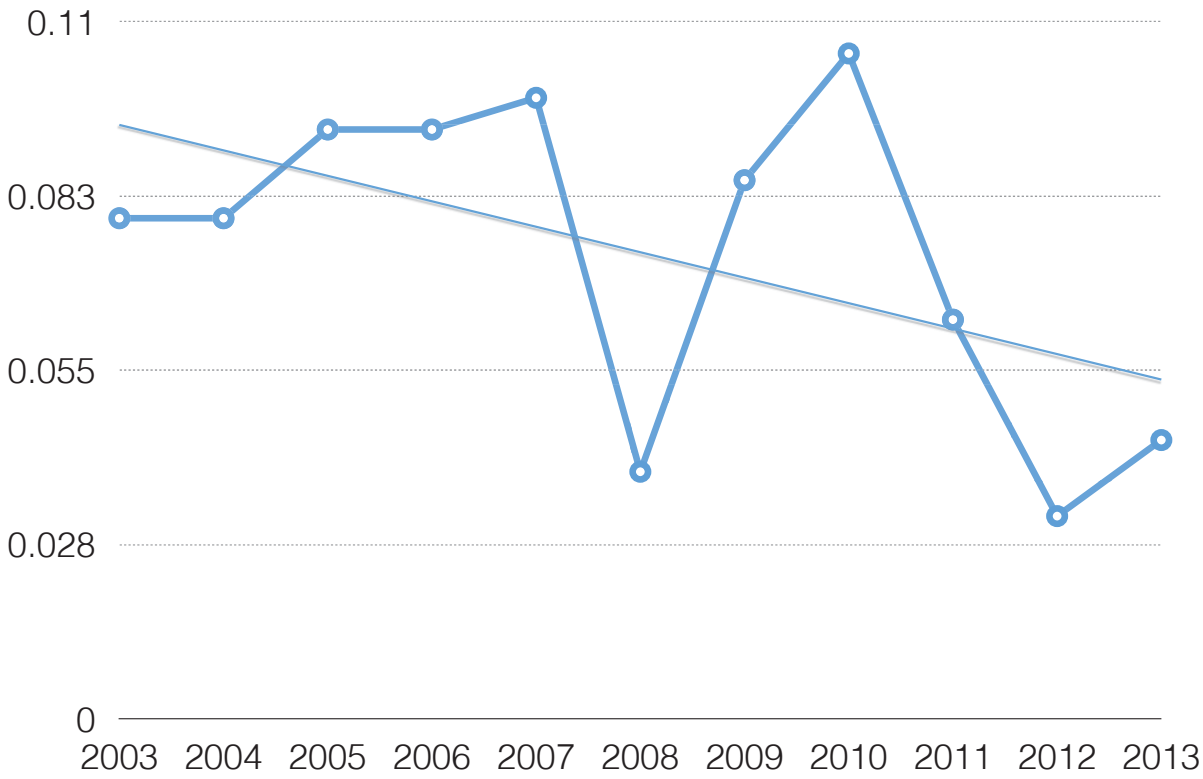
2013
20,000,000 Pumps

Punjab
1,300,000
20,000 Pumps/Year

Crop surpluses consume the most water, waste the most energy

Pursuing GDP Growth

Growth Rate Slowing



India
Coal-fueled power
10,000 mgw/yr
average 2003 to 2013

1370 Megawatt
plant in Tilda

Rising coal production

2013
Production
558 million metric tons

Since 2003
Average annual increase: 20 million metric tons

Demand is rising faster

2013
Demand
772 million metric tons

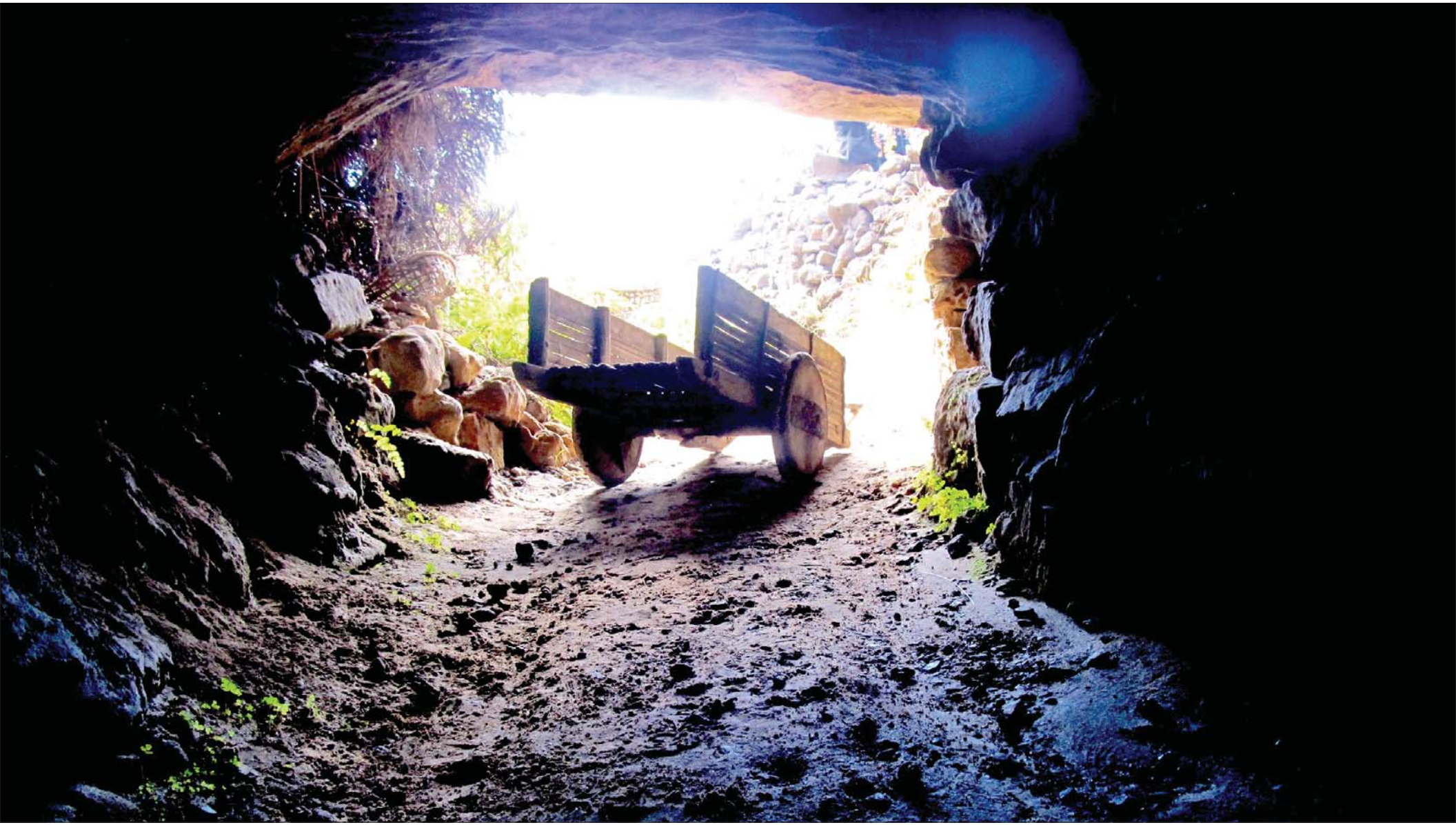
2013
Imports
192 MMT

2003
25 MMT

Jiantia Hills, Megahalaya

Jiantia Hills Box Coal Mine

Rathole Mining, Megahalaya



Serious acid mine drainage

Lukha River Runs Blue

Renewable energy

Potential Capacity
90,000 Megawatts

2014 Generating Capacity
29,462 Megawatts

Solar PV

2,208 Megawatts

Wind

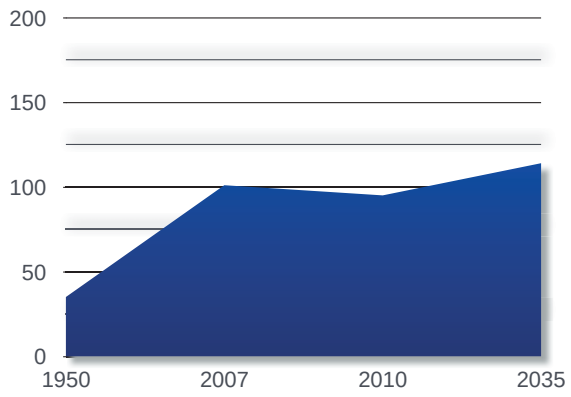
20,298 Megawatts

Biomass

4480 Megawatts

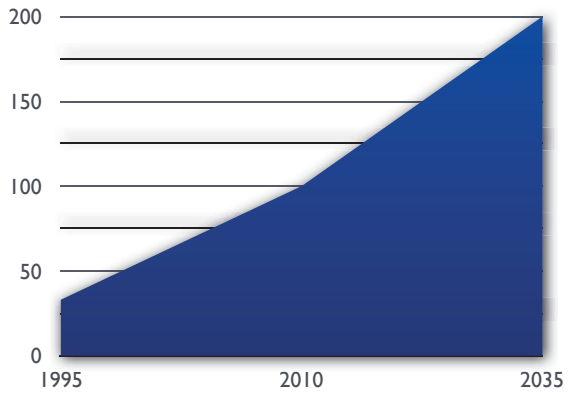
Still Not Nearly What India's Leaders Project

U.S.



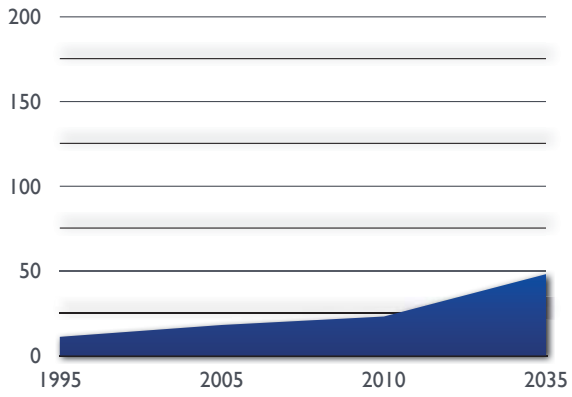
1950	2007	2010	2035
35	101	95	114

China



1995	2010	2035
33	100	200

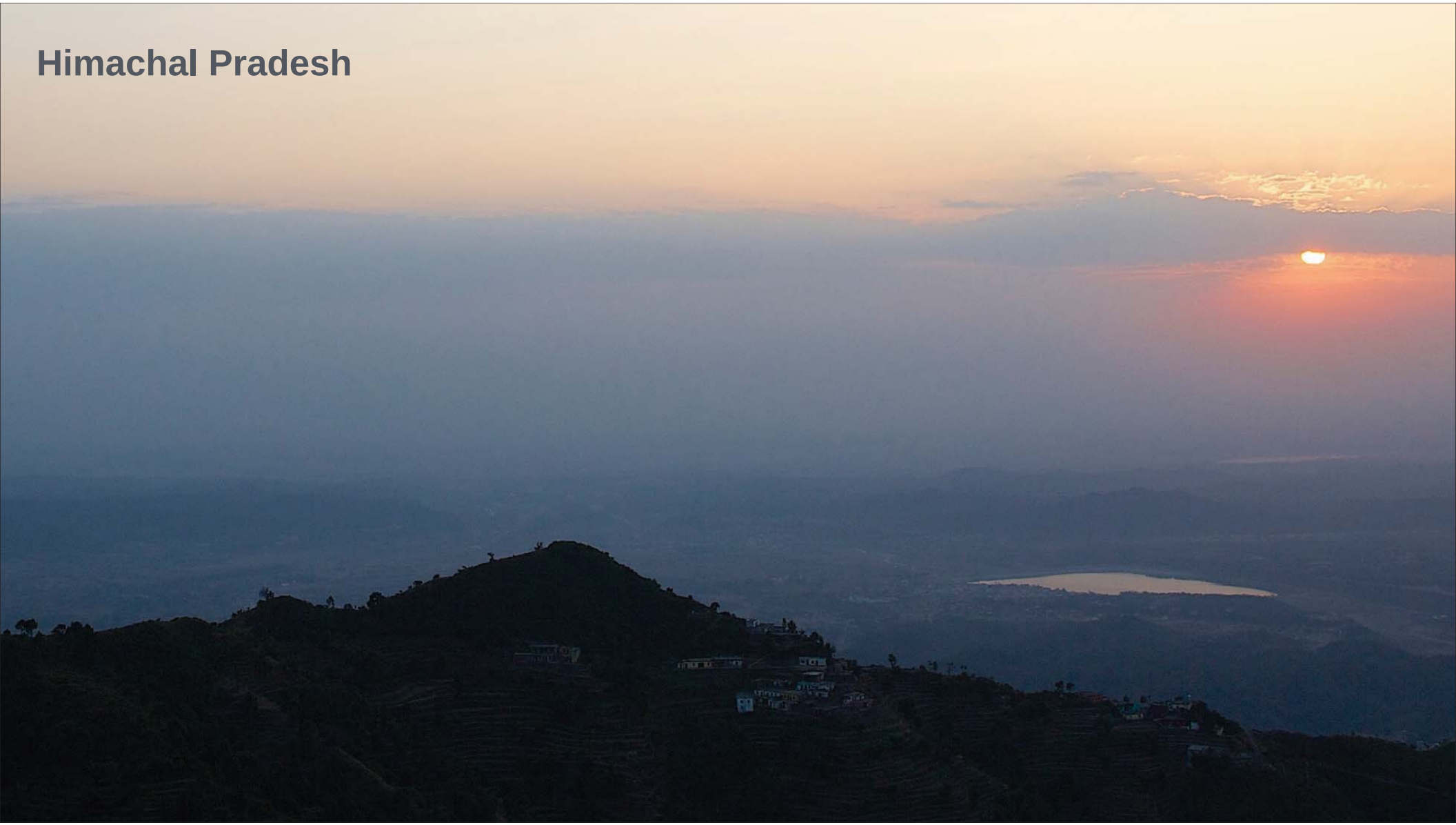
India



1995	2005	2010	2035
11	18	23	48

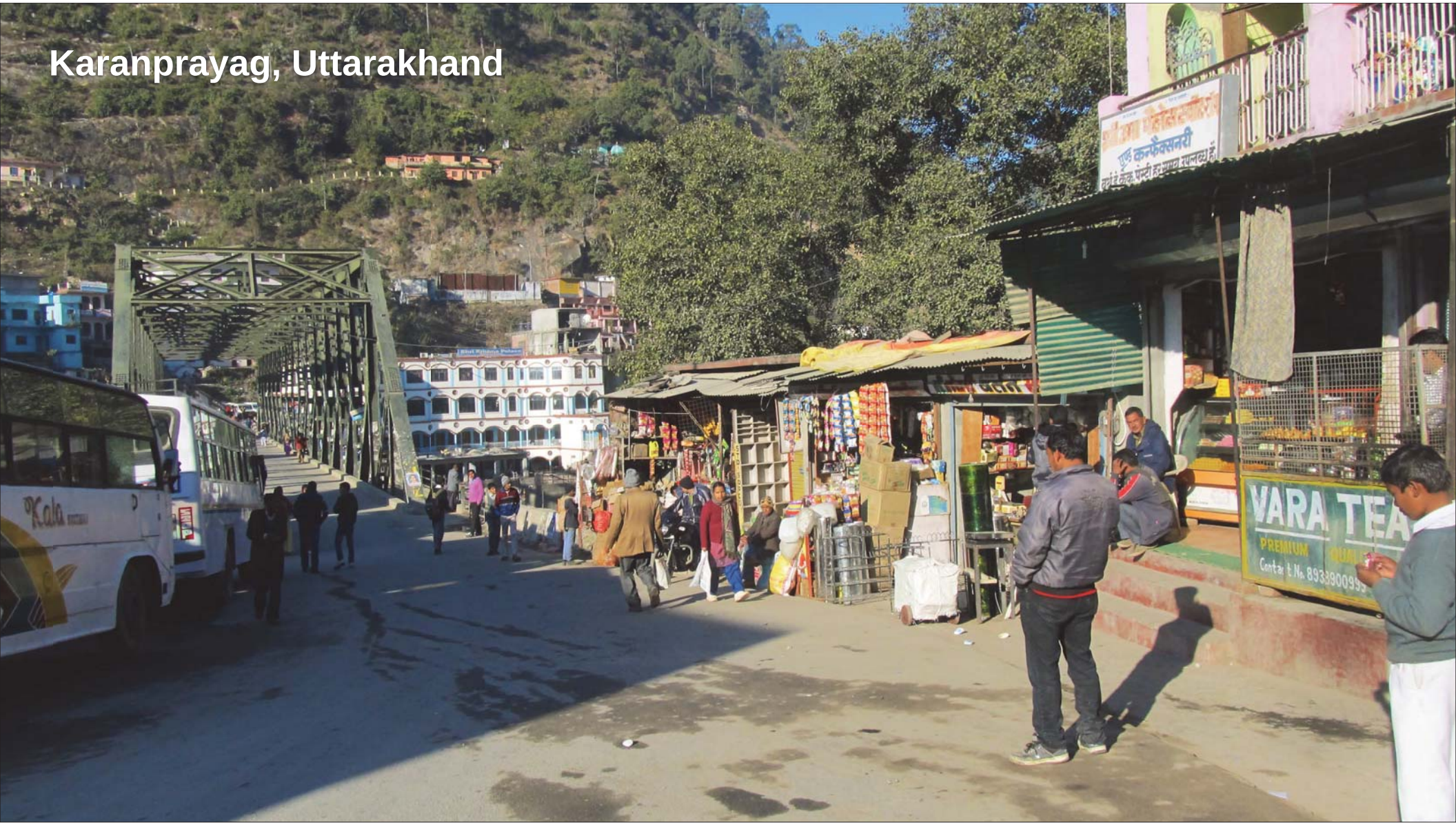
Shanghai
AURORA
MIRAE ASSET
citi

Himachal Pradesh



Khondla, Chhattisgarh

Noh Ki Likai Falls, Megahalaya


Karanprayag, Uttarakhand
कन्फैक्सनरी
VARA TEA
PREMIUM

Jaipur, Rajasthan

CHOKE POINT INDIA

The Competition Between Water, Food, and Energy

circle of blue

Wilson Center

circleofblue.org
@circleofblue

wilsoncenter.org

circle of blue

Wilson Center