

## **Climate Adaptive Action Plans to Manage Heat Stress in Indian Cities**

### **Workshop Summary**

**Date:** 19<sup>th</sup> April-21<sup>st</sup> April, **Time:** 10.30 am – 5:00 pm **Venue:** IIPH-B, Conference Room

**Organized by:** Indian Institute of Public Health- Bhubaneswar

## WORKSHOP SUMMARY

The workshop was organized by IIPH Bhubaneswar with Integrated Research and Action for Development (IRADe) and IIPH-Gandhinagar at IIPH- Bhubaneswar from 19<sup>th</sup> -21<sup>st</sup> April 2018. The agenda of the workshop was to finalize research tools and survey platforms for assessing the impact of heat stress on health, work productivity and livelihood of vulnerable population in the three cities; Rajkot, Bhubaneswar and Delhi.



(L-R): Ms. Asha Kaushik, Ms. Moumita Shaw, Dr. Bhuputra Panda, Dr. Pradeep Nayak, Dr. B.N Mishra, Mr. Sathish, Mr. Mrinal Mohapatra

*Day -1*

19th April, 2018

## Participants

IIPH-Bhubaneswar: Dr. Bhuputra Panda (Associate Professor), Dr. Ambarish Dutta (Associate Professor), Mr. Mrinal Mohapatra (Researcher), Mr. Rudraprasad Panigrahy (IT Specialist)

IRADe: Ms. Moumita Shaw, Ms. Asha Kaushik (Sr. Research Associates)

IIPH-G: Mr. Sathish LM (Consultant, HAP Team)

## Introduction

Dr. Bhuputra Panda welcomed the participants and summarized the workshop agenda, he informed that on the first day of the workshop research tools prepared by IRADe (both for household and individual survey) will be finalized. On the 2<sup>nd</sup> day the participants will finalize the survey platforms in epi info software which can be used both in windows and android format, IIPH-B has successfully used both the platforms in the past. On the 3rd day (21<sup>st</sup> April) participants will be made familiar with survey platforms and data testing will be done. Dr. Panda explained that IIPH-B should complete the field surveys before the onset of Monsoon in Bhubaneswar city and for achieving the same the pilot surveys should be completed before 1<sup>st</sup> May, 2018.

## Major Discussions

Dr. Ambarish Dutta suggested that all the partners should install survey platforms in the phones/android systems/tabs of the investigators, this will help the investigators to easily collect the data on their phones provided they have good battery backup and could avoid taking phone calls in the mid of the process. Another option would be to collect field data in hard copies and later on entering the same in the computers/laptop systems.

### *Thermal hotspot Maps of Bhubaneswar City:*

Ms. Moumita Shaw explained the thermal hotspot maps of Bhubaneswar developed by IRADe GIS team, the thermal surface temperature imageries of Bhubaneswar city taken by LANDSAT 8 were acquired and superimposed on the ward-boundaries map of the city. Dr. Panda suggested to schedule a meeting with senior officials in OSDMA, as the agency might have developed an overall view of hotspots (tentative areas within the city which generally have high temperature during the summers and can be designated as thermal hotspots). He informed that Mr. Pradeep Nayak may join the workshop on 20th April, the team

can discuss the availability of the relevant maps with him.

Mr. Sathish will identify the officials/departments in Rajkot from where the required maps for Rajkot city can be acquired. For every city hotspot wise population data/household data is required for which relevant sources need to be identified.

#### ***Sampling Methodology:***

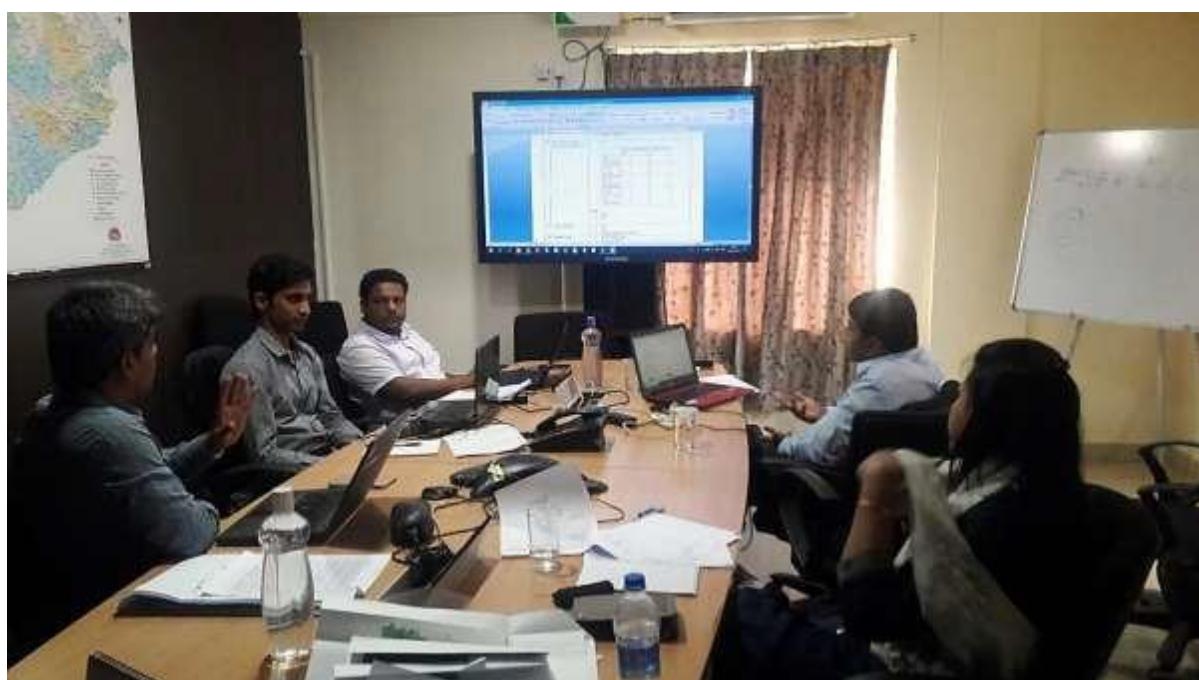
Dr. Panda and Dr. Dutta suggested to adopt Multi—Stratified Random-Cluster sampling methodology for the survey in the three cities (Bhubaneswar, Rajkot and Delhi). For Bhubaneswar City out of 11 thermal hotspots in Bhubaneswar (as delineated in the GIS map developed by IRADe) 5 wards would be selected from across the different regions of the city (North, South, East, west). With each of the selected 5 wards 2

hotspots per ward will be selected and within each hotspot 25 household will be survey. In total a sample of 250 households will be surveyed. Same methodology can be used for survey in other cities.

Dr. Panda was apprehensive about the sample size of 250 households and said that it will not be sufficient enough to provide a comprehensive view regarding the heat stress issues across the city population, but considering the available resources and time constraint, the team can continue with a sample of 250 HH.

#### ***Discussion on Research Tools:***

All the participants had prolonged discussions on the research tools prepared by IRADe team. Firstly, the questionnaire for household onetime was discussed, wherein each question was scrutinized by the team in terms of its relevance to the project objectives. Mr. Mrinal made the necessary changes in the soft copy of the questionnaire and was directed by Dr. Panda to develop the survey platform for the respective questionnaire. Dr. Panda informed that the health section will be revised by the IIPH-B team and will be discussed on 20<sup>th</sup> April.



(L-R): Dr. Bhuputra Panda, Mr. Rudraprasad Panigrahy, Mr. Mrinal Mohapatra, Mr. Sathish,

Ms. Moumita Shaw

## Day -2

20th April, 2018

### Participants

IIPH-Bhubaneswar: Dr. Bhuputra Panda (Associate Professor), Dr. Ambarish Dutta (Associate Professor), Mr. Mrinal Mohapatra (Researcher), Mr. Rudraprasad Panigrahy (IT Specialist)

IRADE: Ms. Moumita Shaw (Sr. Research Associate), Ms. Asha Kaushik (Sr. Research Associate)

IIPH-G: Mr. Sathish LM, (Consultant, HAP Team)

OSDMA: Dr. Pradeep Nayak (GM), Dr. BN Mishra (GIS Specialist)

### Major Discussions

The participants discussed all the questions on revised health section of HH-one-time questionnaire and finalized one research tool.

Dr. B.N Mishra informed that population data for the thermal hotspots is not available in any of the authorities/departments in Bhubaneswar so, for getting an estimation of the population data of thermal hotspots some mathematical calculation on the available ward wise population data can be done.

#### *Thermal hotspot Maps of Bhubaneswar City:*

Dr. B.N Mishra discussed that thermal satellite imageries do not provide high resolution data, moreover they provide only surface temperature data so, such data can't be taken as base to mark hot spots as ambient air temperature is more important to measure the heat related discomfort (heat stress) rather than surface temperature. For this we need to find sources from where ambient temperature can be obtained in order to know thermal hotspots in the city. Dr. B.N Mishra insisted to collect ambient temperature data for all the wards in Bhubaneswar so, that it can be compared with the existing surface temperature data.

Mr. Mrinal suggested that there must be some correlation between surface temperature and ambient temperature which if established will make it easier to mark thermal hotspots in Bhubaneshwar.

Dr. Bhuputra Panda contacted IMD-Bhubaneswar director to take his viewpoint about satellite imageries and ward-wise temperature data for the city, the director indicated that IMD has only one existing weather station near airport and three more installed by various institutions, however the ward wise ambient temperature and humidity data for Bhubaneswar city can only be collected using a Physchrometer.

**IRADE can procure thermal imageries with surface temperature data for the particular days and IIPH-B/G can plan field visits for collecting ambient temperature and humidity data by physchrometer**

IRADE team later suggested that ambient temperature data could be collected for maximum for 15 wards spread across various regions of the city, the thermal hotspot maps generated by IRADE- GIS team (using

the Landsat 8 thermal imageries, band 10 images, 4 satellite images for every month collected at 10:30 am) can be used as base maps for the same.

Dr. Mishra suggested that IRADe can contact the **Commissioner of Bhubaneswar Municipal Corporation (BMC) or ORSAC for land use maps** (1:4000 scale land use maps are prepared by Orissa space application center (ORSAC) for all the cities in Orissa). He informed that ward-wise hazard maps are not available with OSDMA and they have already shared ward boundaries map with IRADe team.

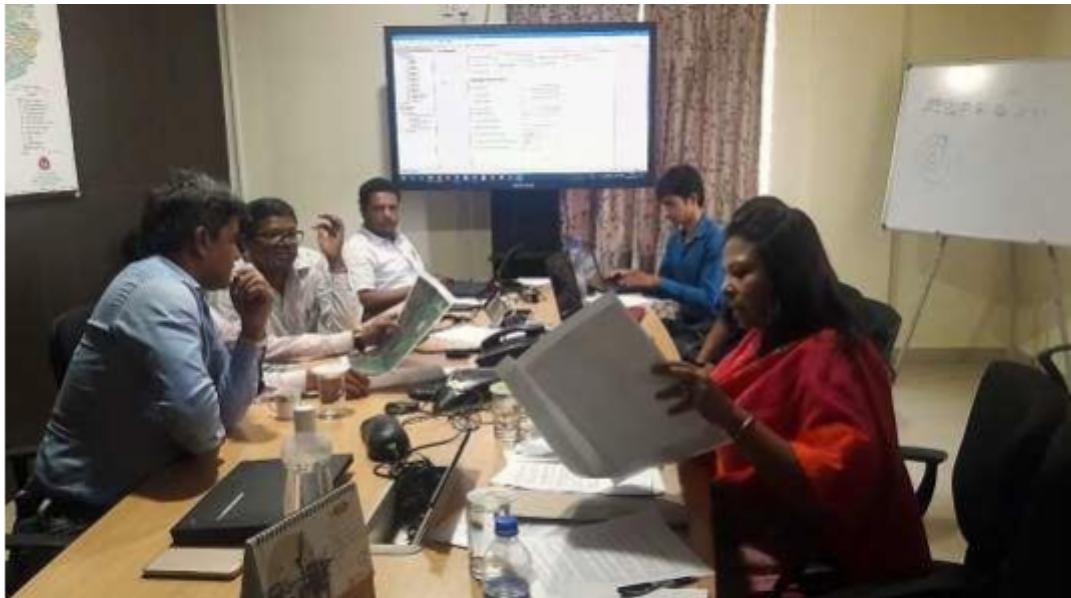
It was also suggested by Dr. Dutta that the ward-wise mortality data for summer months can be an important indicator in deciding the hot spots for survey, as there is existing literature that supports relationship between mortality and ambient temperature. Ms. Moumita further added that the mortality data can be superimposed on the thermal hotspots maps to clearly mark the heat hotspots in the selected cities. **The**

**ward-wise mortality data for the city can also be collected from BMC.** Dr. Panda thanked OSDMA for their productive inputs and expressed desire to collaborate with them in future.

#### ***Discussion on Research Tools:***

All the questions in both the research tools; household one time and household-time variant were reviewed and finalized. Survey platforms for both questionnaires were prepared and it was decided that IRADe team will be provided hands-on training for using the software epi-info for data collection 21<sup>st</sup> April. Dr. Panda said that the revised research tools will be shared with all the partners again, partners can share their comments by 23<sup>rd</sup> of April, 2018 so that IIPH-B can resume pilot surveys to test the validity of the survey tools most probably on 25<sup>th</sup> of April.

Mr. Bhuputra Panda further indicated that all the communication with regards to the project should be marked to principal investigators both in IIPH-B and IIPH-G in order to avoid communication gap. Dr. Panda expressed the desire to have discussions with IRADe-PI (Rohit Magotra) regarding requirement of additional human-resources to support the project work in Bhubaneswar. A meeting was scheduled with BMC commissioner at 6:00 pm at BDA office, IRADe team along with Dr. Panda went for the meeting but due to the very tight schedule of the commissioner the meeting was cancelled, Dr. Panda, decided to approach him again and request for land use maps and ward wise mortality data for the city.



(L-R): Dr. Bhuputra Panda, Dr. B.N Mishra, Dr. Pradeep Nayak, Mr. Mrinal Mohapatra,

Mr. Rudra, Mr. Sathish, Ms. Moumita Shaw

## **Day -3**

21<sup>st</sup> April, 2018

## **Participants**

IIPH-Bhubaneswar: Dr. Bhuputra Panda (Associate Professor), Dr. Ambarish Dutta (Associate Professor), Mr. Mrinal Mohapatra (Research), Mr. Rudraprasad Panigrahy (IT Specialist)

IRADe: Ms. Moumita Shaw (Sr. Research Associate), Ms. Asha Kaushik (Sr. Research Associate)

IIPH-G: Mr. Sathish LM (Consultant, HAP Team)

## **Major Discussions**

On the third day of the workshop the participants from IRADe (Ms. Moumita Shaw and Ms. Asha Kaushik) and IIPH-G (Mr. Sathish LM) were trained to use epi info survey platforms created by Dr. Ambarish Dutta, Mr. Rudraprasad Panigrahy and Mr. Mrinal Mohapatra for recording collected data. The participants clarified their queries and learnt to use the platforms both on android and windows systems.

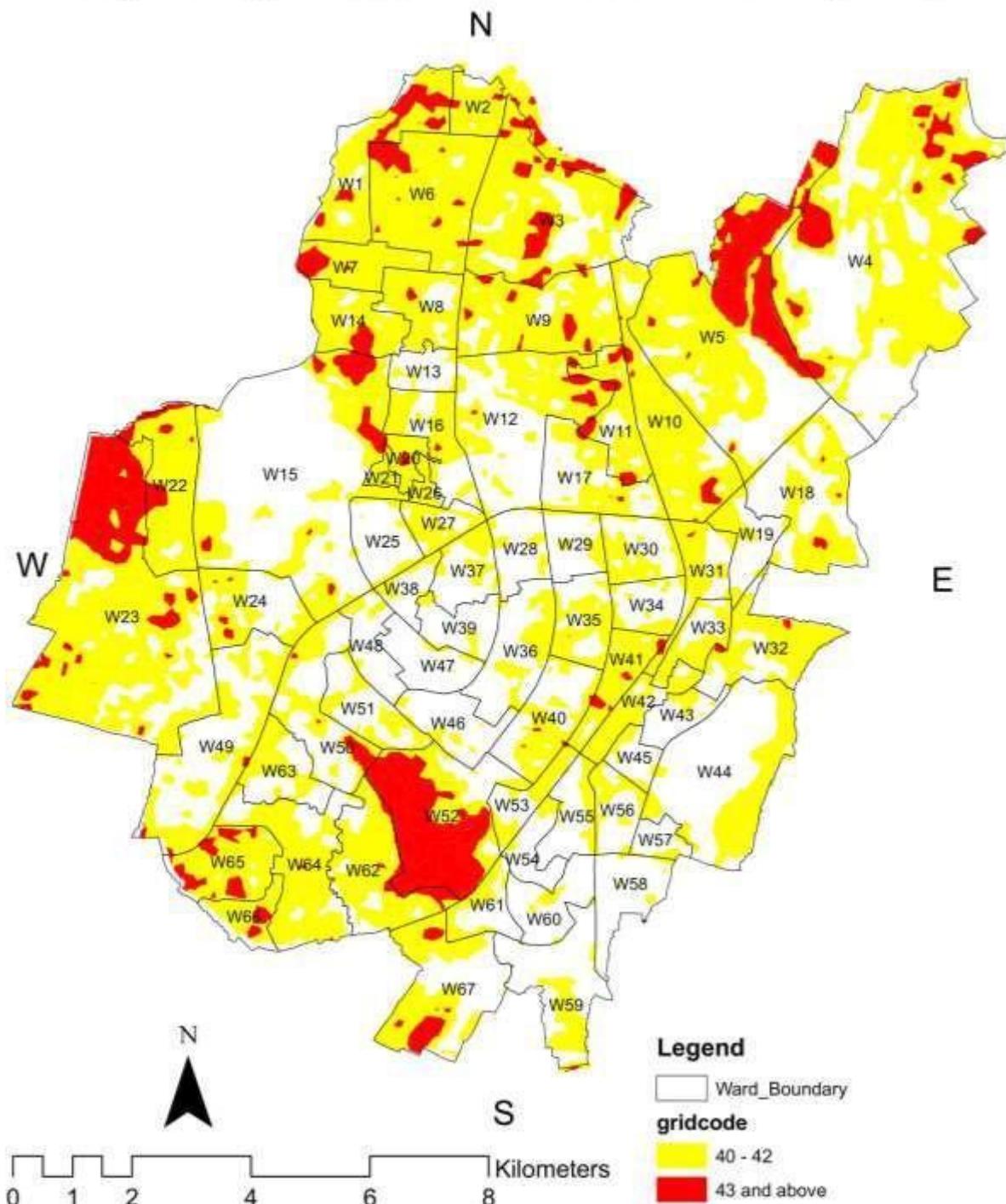
## **Major follow ups**

- Dr. Bhuputra Panda will schedule a meeting with BMC commissioner Dr. Krishnan Kumar and can request him for Land use maps of Bhubaneswar City (1:4000 scale land use maps are prepared by Orissa space application center (ORSAC) for all the cities in Orissa) and ward-wise mortality data for the city
- Orissa space application center (ORSAC) can also be approached for land use maps of Bhubaneswar City
- IRADe can procure thermal imageries with surface temperature data for the particular days and can plan field visits for collecting ambient temperature and humidity data by psychrometer
- Sathish will help in arranging ward boundaries and land-use maps for Rajkot.
- IIPH-B will share the revised research tools with all the participants /partners, once the research tools will be reviewed by all the partners, IIPH-B can go ahead with field testing
- The SOP for the research tool developed will also be prepared by IIP-B and will be shared with the team. This will include the definition and explanation required to define certain terms used in the research tool and other assistance as and when required by the interviewer.

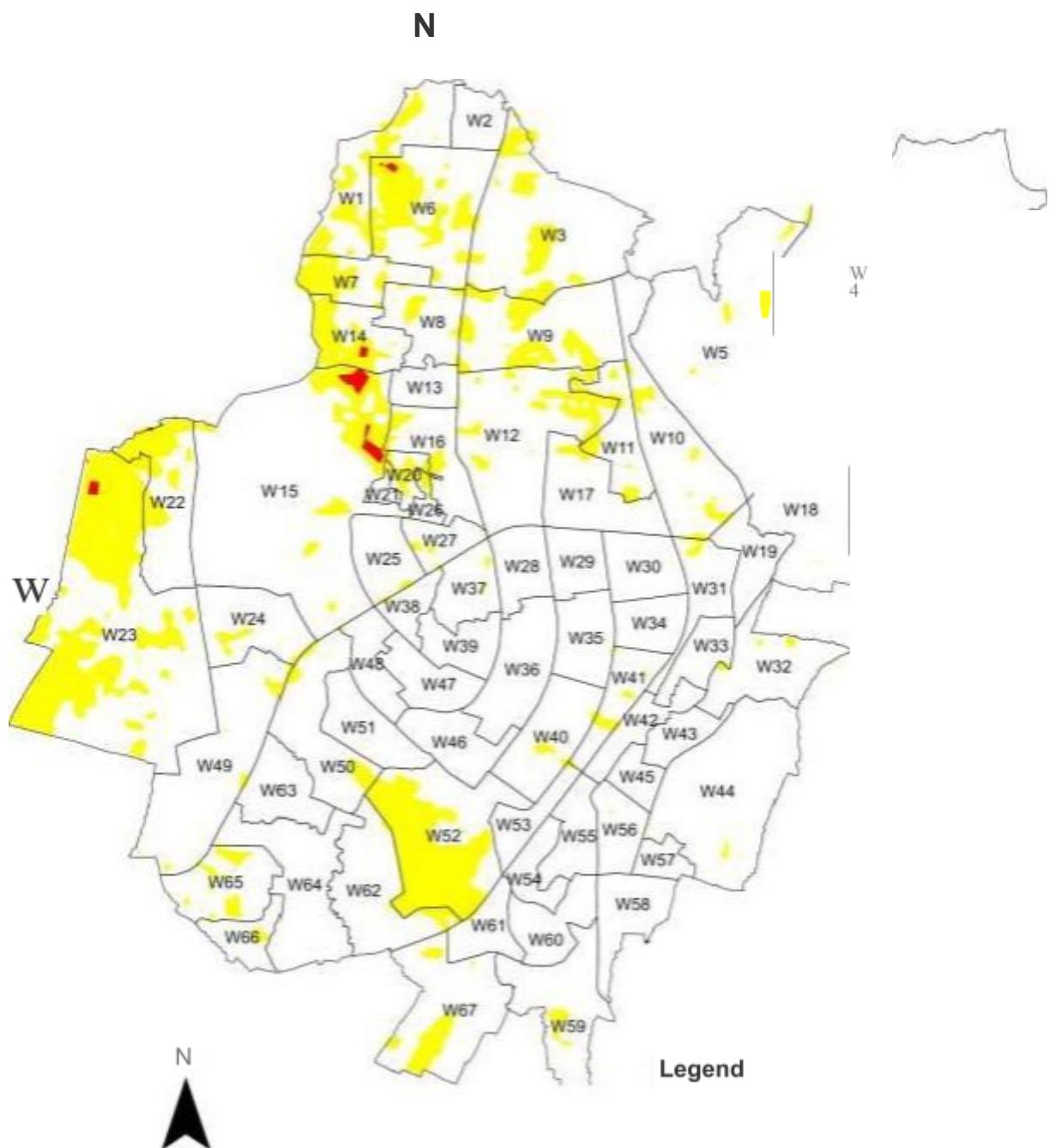
## Annexure 6: Hot Spot Maps

### Bhubaneshwar

Hotspot map Bhubaneswar as on 12th April 2017



## Hotspot map Bhubaneswar as on 14th May 2017



*Delhi*

## Hotspots as on 6 April 2017

