

IWMI DAN Activities – 2015

Giriraj Amarnath, IWMI

2015 Floods in Sri Lanka



WEATHER FORECAST FOR SEA AREAS AROUND THE ISLAND DURING
Source: Dept. of Meteorology, Sri Lanka
NEXT 24 HOURS (Issued at 05.30 a.m. on 01st October 2015)

Showers or thundershowers will occur at times in the sea areas off the coast extending from Puttalam to Hambantota via Colombo and Galle. Showers or thundershowers will develop at most places in the sea areas around the island after 2.00 pm.

Winds will be Southwesterly and speed will be 20-40 kmph.

Thesea area extending from Puttalam to Kankasanturai via Mannar and Matara to Batticaloa via Hambantota will be fairly rough at times as the winds can strengthen up to 50 kmph at times.

The sea areas around the island may be temporary very rough during thundershowers

At the request of DMC (Sri Lanka) IWMI activated disaster charter with Sentinel Asia and maps preparation in progress

10 days Rainfall Forecast information Colombo

DAY	HIGH/LOW	COND
TODAY Oct 1	29 ^c /24 ^f	☀️ Partly Cloudy
FRI Oct 2	31 [°] /24 [°]	☁️⚡️ PM Thunderstorms
SAT Oct 3	29 [°] /25 [°]	☀️ Partly Cloudy
SUN Oct 4	29 [°] /25 [°]	☁️⚡️ Thunderstorms
MON Oct 5	29 [°] /25 [°]	☁️⚡️ Thunderstorms
TUE Oct 6	28 [°] /24 [°]	☁️⚡️ Thunderstorms
WED Oct 7	29 [°] /25 [°]	☀️⚡️ AM Thunderstorms
THU Oct 8	30 [°] /25 [°]	☀️⚡️ Scattered Thunderstorms
FRI Oct 9	29 [°] /25 [°]	☀️⚡️ Scattered Thunderstorms
SAT Oct 10	29 [°] /25 [°]	☀️⚡️ Scattered Thunderstorms

It is expected there will be showers and thundershowers in most of the districts in southern provinces.

Hambantota

DAY	HIGH/LOW	COND
TODAY Oct 1	30 ^c /23 ^f	☀️ Partly Cloudy
FRI Oct 2	31 [°] /24 [°]	☁️⚡️ PM Thunderstorms
SAT Oct 3	32 [°] /24 [°]	☁️⚡️ PM Thunderstorms
SUN Oct 4	32 [°] /24 [°]	☁️⚡️ PM Thunderstorms
MON Oct 5	32 [°] /24 [°]	☀️⚡️ Isolated Thunderstorms
TUE Oct 6	31 [°] /24 [°]	☁️⚡️ PM Thunderstorms
WED Oct 7	32 [°] /24 [°]	☀️ Partly Cloudy
THU Oct 8	32 [°] /24 [°]	☁️⚡️ PM Thunderstorms
FRI Oct 9	32 [°] /24 [°]	☁️⚡️ PM Thunderstorms
SAT Oct 10	32 [°] /24 [°]	☀️⚡️ Isolated Thunderstorms

Matara

DAY	HIGH/LOW	COND
TODAY Oct 1	30 ^c /23 ^f	☀️⚡️ Isolated Thunderstorms
FRI Oct 2	31 [°] /24 [°]	☁️⚡️ PM Thunderstorms
SAT Oct 3	32 [°] /24 [°]	☁️⚡️ PM Thunderstorms
SUN Oct 4	31 [°] /24 [°]	☁️⚡️ Scattered Thunderstorms
MON Oct 5	31 [°] /24 [°]	☁️⚡️ Thunderstorms
TUE Oct 6	31 [°] /24 [°]	☁️⚡️ Thunderstorms
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Data source: Global Forecast System

2015 FLOODS IN SRI LANKA MONITORED USING SATELLITE RAINFALL ESTIMATES

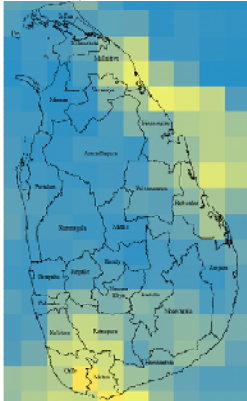
01 October 2015
 FL 2015 0001 SL
 Version 1.0

Satellite rainfall estimates from Global Precipitation Mission (GPM) and Tropical Rainfall Measuring Mission (TRMM) revealed extraordinary flooding in Sri Lanka caused by unusually strong monsoonal rainfall over the period 10 September - 30 September 2014.

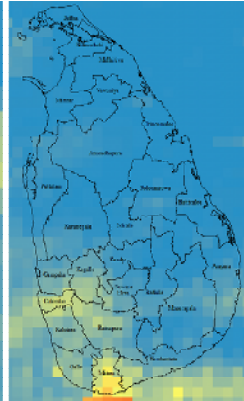
The exceptional rainfall occurred mainly in the Southern, Northcentral and Uva Province of Sri Lanka. Massive flooding was reported in the districts of Kalutara, Ratnapura and in parts of Colombo, Galle and Matara. The accumulated rainfall was about 2 to 3 times as high as compared to the rainfall in the same period in 2014. For example, the southern provinces districts received an average accumulated rainfall of more than 100mm from 24 to 30 Sept. 2015 - compared to 75mm in 2014. At district level (Galle 198mm in 2015 vs. 121mm in 2014; Matara 142mm in 2015 vs. 78mm in 2014; Polonnaruwa 136mm in 2015 vs. 98mm in 2014).

From the public sources, at least 18,917 persons have been affected by the severe weather condition prevailing in the Southern Province for several days, the Disaster Management Center (DMC) said. The DMC was warned people living by the Gin Ganga to be vigilant on rising water levels, especially by-roads and low lands in the Galle District.

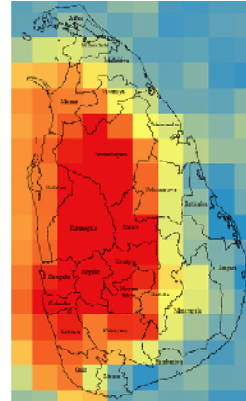
11-20 Sept 2014



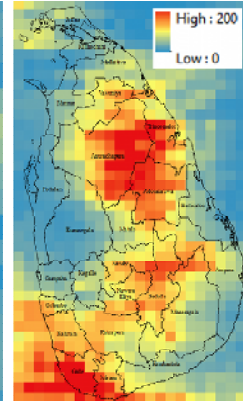
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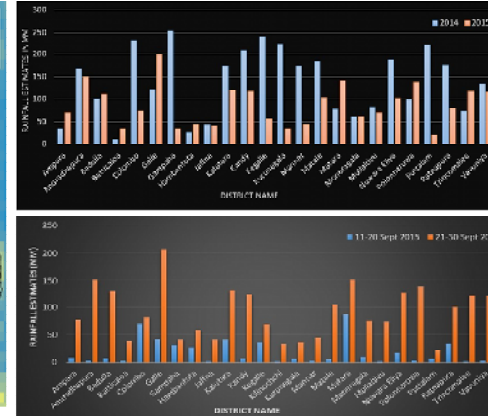
21-30 Sept 2014



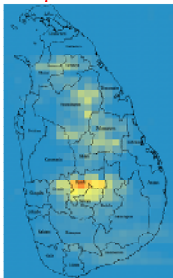
21-30 Sept 2015



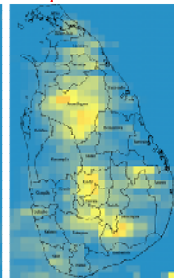
Accumulated rainfall Sept. (2014 and 2015) & Rainfall events from 11 - 30 Sept.



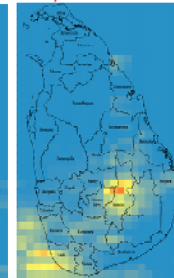
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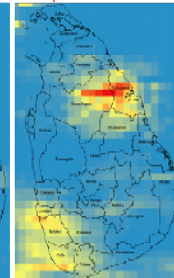
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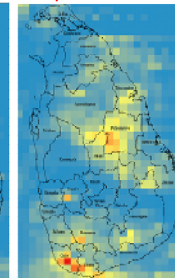
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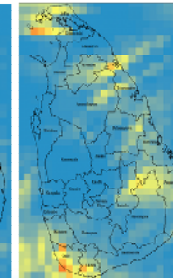
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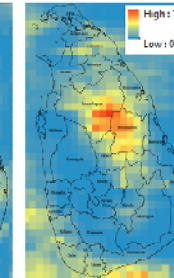
28 Sept 2015



29 Sept 2015



30 Sept 2015



Map Prepared by
International Water Management Institute (IWMI)

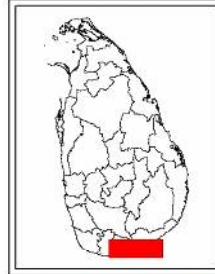


Data Source



Mapping Floods in Southern Provinces - Sri Lanka using ALOS-2 PALSAR-2 Satellite Images

02 October 2015 | FL-2015-0001-SL | Version 1.1



IWMI and DMC in close association with Sentinel Asia System (SAS) and JAXA activated the charter on October 1, 2015 to provide satellite images covering the Southern Provinces. SAS quickly provided images of 30 September 2015 and 1st October 2015 for its use in emergency response and relief operation. IWMI using the IFMAN tool processed the flood extent covering the districts of Hambantota, Galle, Matara, Monaragala and Ratnapura.

In total an area of 365 sq.km were inundated as viewed by ALOS PALSAR Satellite images taken on 30 September 2015. Approximately 150sq.km of paddy fields were flooded. The data sources from Survey Department of Sri Lanka was used for this analysis purpose. Major flooded affected divisions are Hambantota, Tanamalwila, Lunugamwehara, Tissamaharama, Wellawaya and Embilipitiya. In terms of major paddy field affected division's area Hambantota, Tanamalwila, Tissamaharama, Lunugamwehara and Tangalla. For the ALOS PALSAR-2 images taken on 1st October 2015, the affected districts are mainly the Matara and Galle. The divisions that includes Thihagoda, Kamburupitiya, Malimbada, Akuressa, Mulatiyana. In total 15 divisions were affected with a maximum inundation of 89sq.km of which paddy fields affected area is 47sq.km. The division with paddy field affected areas are Thihagoda, Malimbada, Kamburupitiya.

Legend

Before Disaster Image : ALOS-2 PALSAR 2
 Date : 18 Feb. 2015
 After Disaster Image : ALOS-2 PALSAR 2
 Date : 30 Sept.2015

- Flood Extent (30 Sept 2015)
- Permanent Water bodies
- Division Map
- Cities/Town
- Road
- Streams

Map Prepared by:



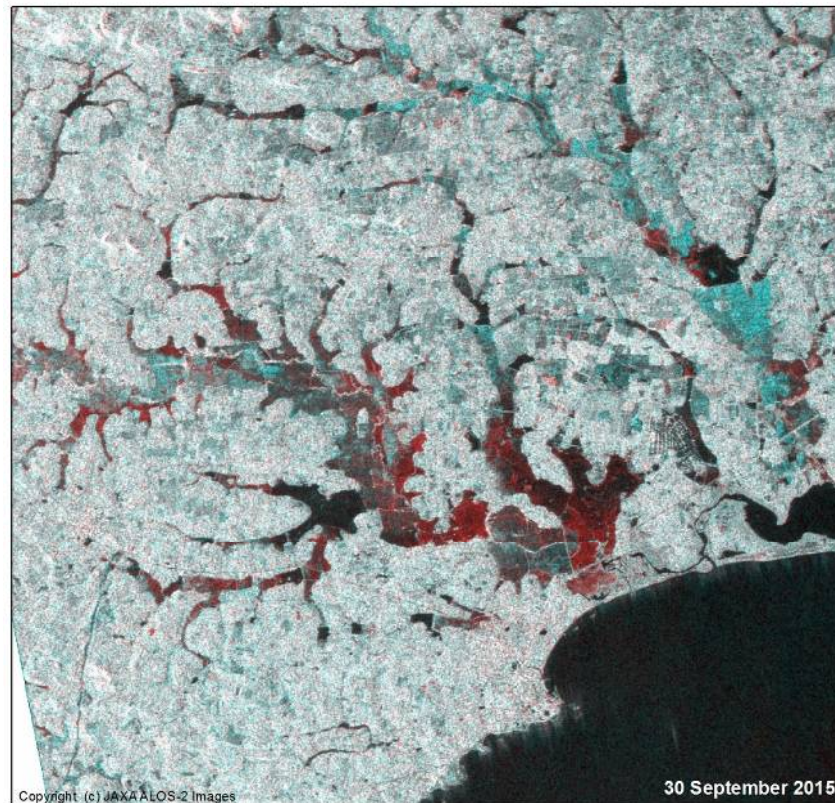
Data Provided by:



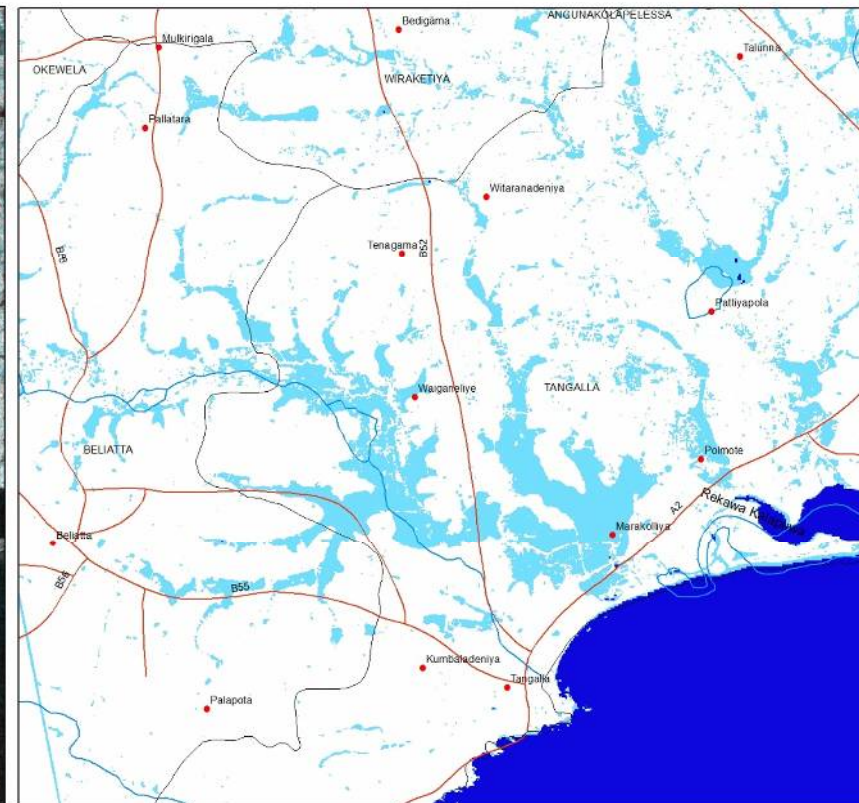
0 0.5 1 2 3 4 Kilometers

The analysis excluded permanent water bodies including reservoir, tanks and ponds and this reflects only the inundation extent. Please note the surface water extent mapped has not yet been validated in the field.

The depiction and use of boundaries, geographic names and related data shown in these maps are based on the sources they have been drawn from and quoted. These are neither error-free nor do they imply official endorsement or the position of IWMI.



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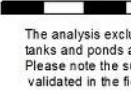
Before Disaster Image: ALOS-2 PALSAR 2
Date : 18 Feb. 2015
After Disaster Image : ALOS-2 PALSAR 2
Date : 01 October 2015

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Map Prepared by:



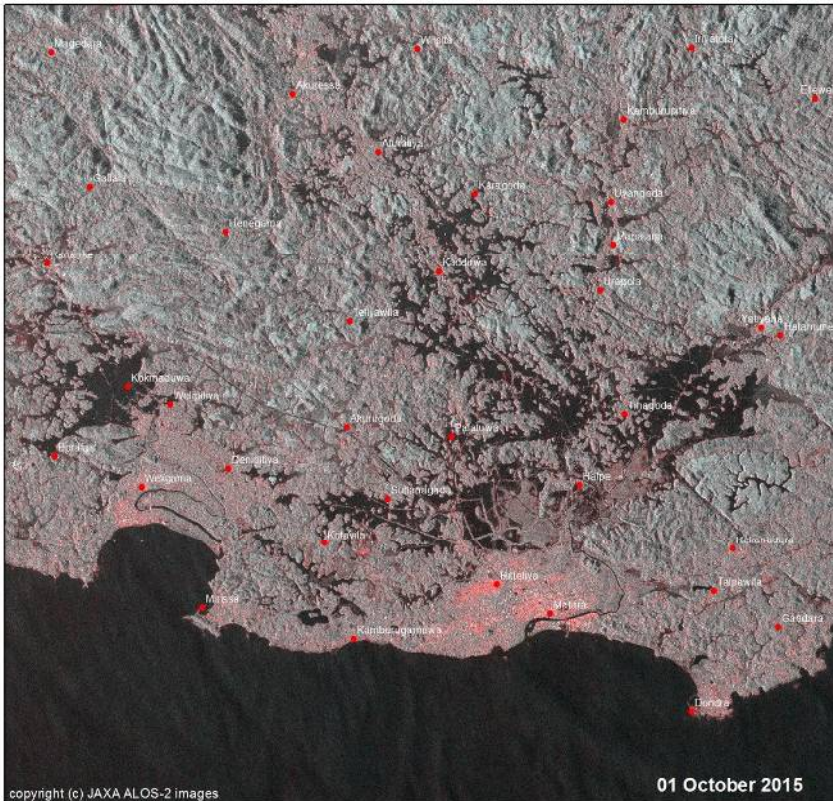
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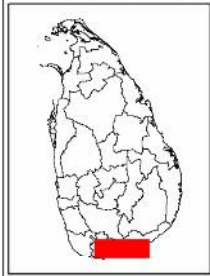
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Date : 18 Feb. 2015
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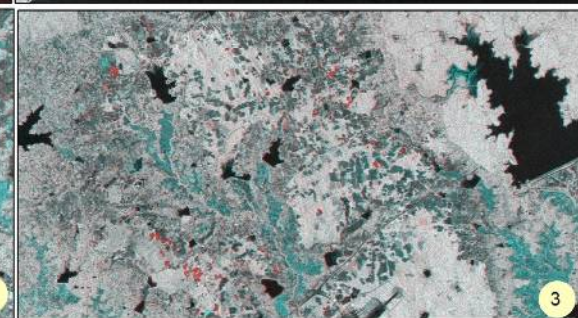
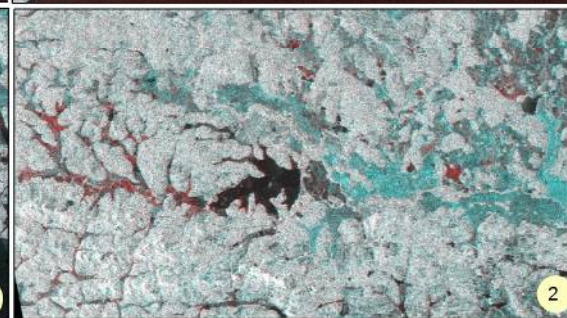
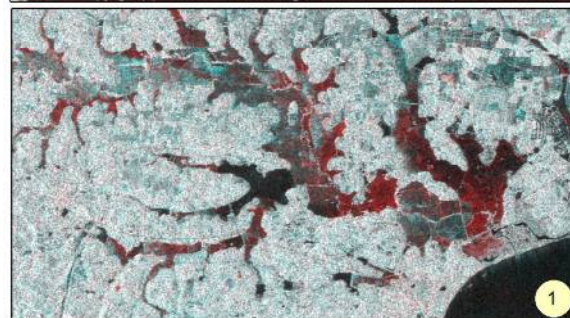
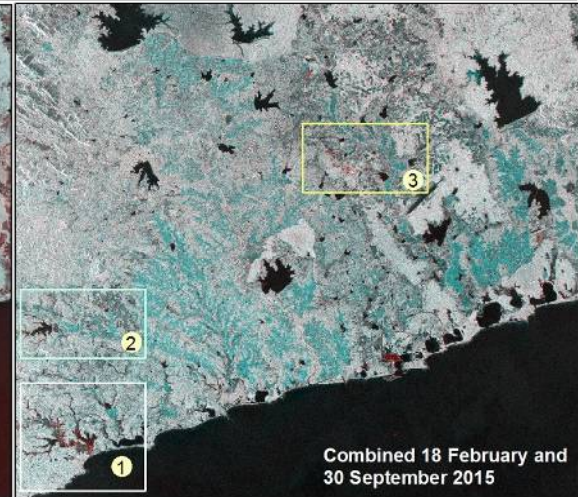


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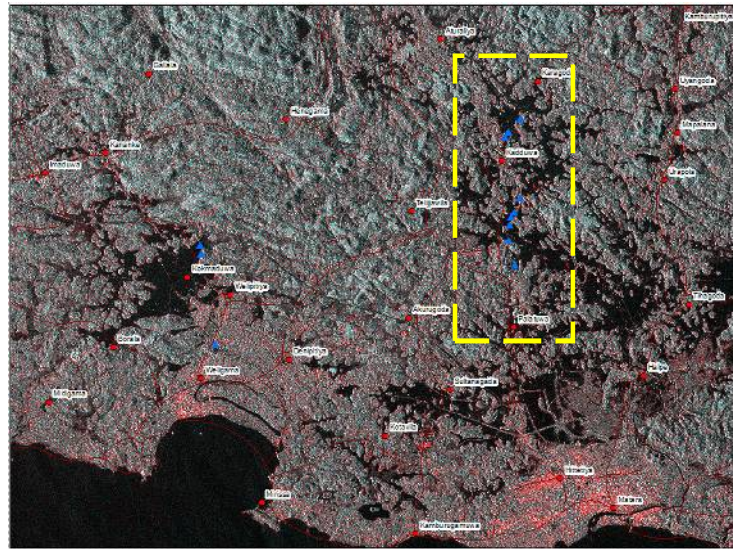


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2015 Floods in southern province of Sri Lanka (Nilwala River)



District	2015 Sep 30 Image	Flood Area km ²	LU_Damage Area km ²
	DIVISEC		
Rathnapura	GODAKAWELA	1.57	0.63
Rathnapura	WELIGEPOLA	1.16	0.39
Rathnapura	KOLONNA KORALE	4.81	2.36
Rathnapura	EMBILIPITIYA	19.84	14.01
Monaragala	BUTTALA	14.95	0.34
Monaragala	WELLAWAYA	26.04	7.22
Monaragala	TANAMALWILA	60.50	17.50
Hambantota	KATUWANA	1.80	0.33
Hambantota	WIRAKETIYA	10.02	4.84
Hambantota	ANGUNAKOLAPELESSA	9.37	6.24
Hambantota	AMBALANTOTA	13.56	6.52
Hambantota	HAMBANTOTA	73.74	23.80
Hambantota	SURIYAWEWA	22.04	4.18
Hambantota	LUNUGAMWEHARA	49.36	12.35
Hambantota	TISSAMAHARAMA	31.52	15.80
Hambantota	TANGALLA	19.90	12.47
Hambantota	BELIATTA	4.19	2.87
Hambantota	OKEWELA	0.93	0.34

District	2015 Oct 01 Image	Flood Area km ²	LU_Damage Area km ²
	DIVISEC		
Galle	AKMEEMANA	0.65	0.32
Galle	BOPE-PODDALA	0.64	0.46
Galle	YAKKALAMULLA	1.67	0.37
Galle	HABARADUWA	4.41	1.87
Matara	MULATIYANA	6.89	1.71
Matara	AKURESSA	7.64	2.92
Matara	MALIMBADA	9.44	6.10
Matara	KAMBURUPITIYA	12.23	5.90
Matara	HAKMANA	2.51	0.63
Matara	DIKWELLA	2.26	0.92
Matara	THIHAGODA	17.96	13.20
Matara	WELIGAMA	6.42	4.15
Matara	MATARA	6.34	3.12
Matara	DEVINUWARA	3.90	2.06
Matara	WELIPITIYA	5.61	3.34

2015 Chennai floods

Second Wave of Catastrophic Flooding in Chennai (Tamil Nadu), India



Last month saw Chennai's wettest November in a century. Home to 4.3 million people, the city's rainfall of 490 mm on 1 December was the highest in 100 years. The result has been widespread flooding with many parts of the conurbation under water. Over 250 people are feared dead, with many more made homeless. On Thursday Prime Minister of India Narendra Modi surveyed the submerged state capital and adjoining areas and announced an immediate relief of 300million USD for flood-hit Tamil Nadu. Other areas of Tamil Nadu and Andhra Pradesh are also affected by floodwater.

IWMI in cooperation with Sentinel Asia In particular Japan Aerospace Exploration Agency (JAXA) activated disaster charter for December 03, 2014 at 16:43hours using ALOS-2 PALSAR-2 images. The images clearly highlight areas of standing water in and around Chennai city. Approximately 25km² is still inundated by extreme rainfall between Nov 30 and Dec 2, 2015.

Overflowing rivers and lakes pose added threats to India's fourth largest city as the number of troops deployed in rescue effort is doubled to 4,000 Thousands of people were trying to escape flooding in the Indian city of Chennai on 04 Dec Friday amid fears that further heavy rain will cause more destruction. "The rain is not a problem now, it is the overflowing river and 30 lakes that continue to flood four districts," a senior home ministry official in New Delhi told Reuters.

The maps can be very well used by NDRF, Flood Control Room and aid agencies to understand the areas where floods are receding and standing water to prepare emergency response maps in support of relief and rescue operations.

Legend

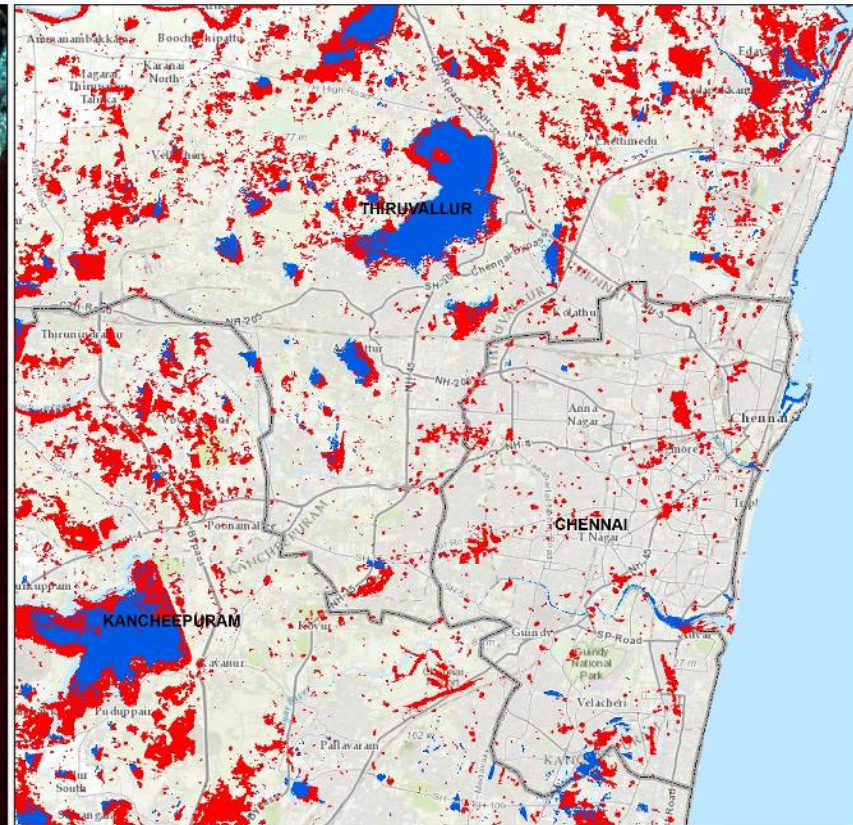
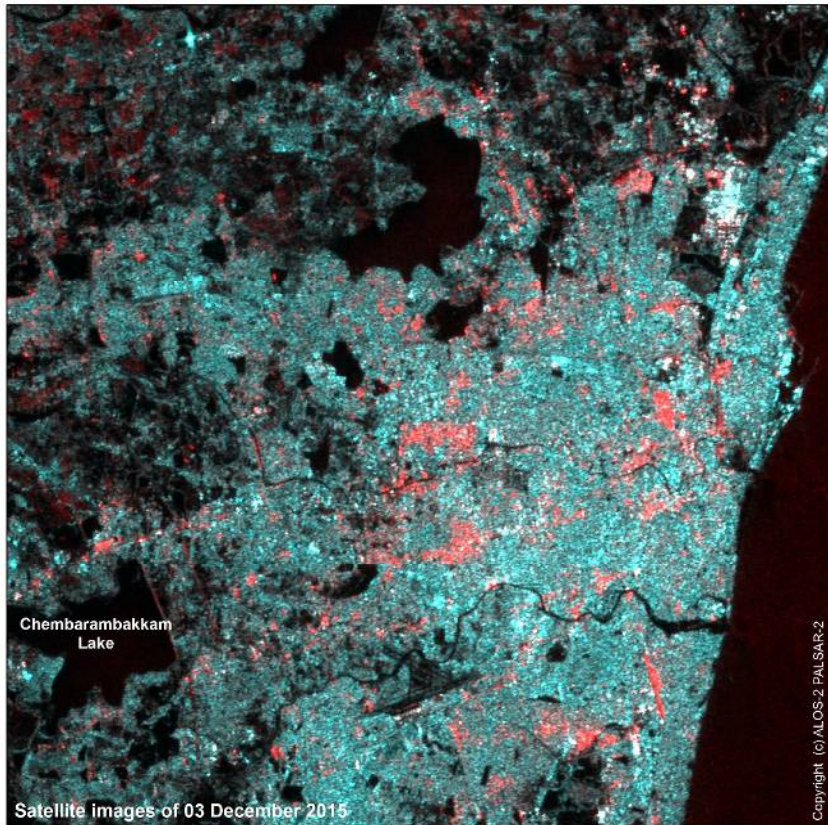
Flood Date : 03 December 2015
Satellite Image : ALOS-2 PALSAR-2

- 03 Dec. 2015 (Post Disaster)
- River/Permanent water
- Roads
- Railways
- Waterways
- Urban / Land Use
- District boundary
- Places

Map Prepared by: Data Provided by:



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Overflowing rivers and lakes pose added threats to India's fourth largest city as the number of troops deployed in rescue effort is doubled to 4,000. Thousands of people were trying to escape flooding in the Indian city of Chennai on 04 Dec Friday amid fears that further heavy rain will cause more destruction. "The rain is not a problem now, it is the overflowing river and 30 lakes that continue to flood four districts," a senior home ministry official in New Delhi told Reuters.

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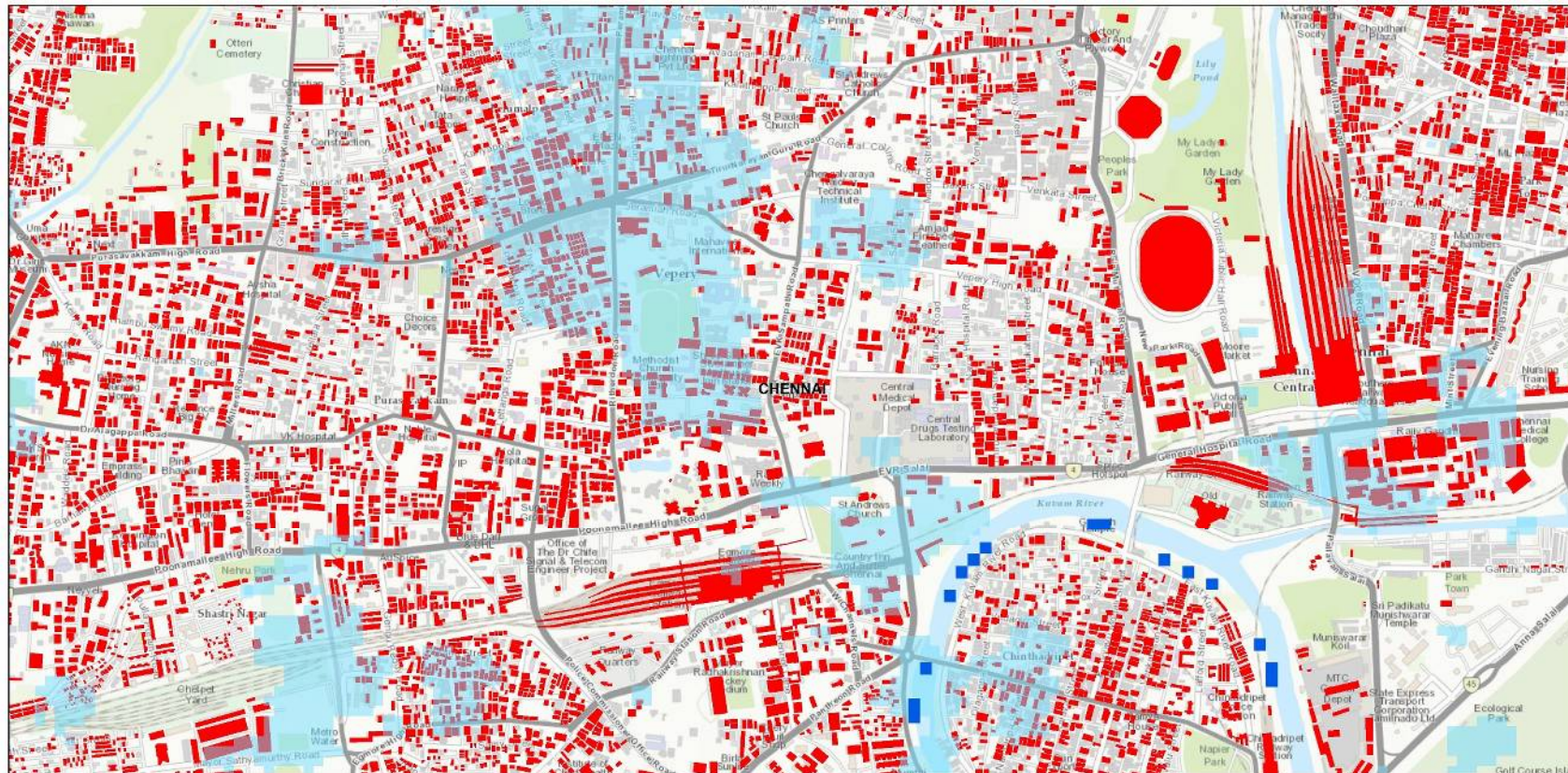
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Second Wave of Catastrophic Flooding in Chennai (Tamil Nadu), India



Last month saw Chennai's wettest November in a century. Home to 4.3 million people, the city's rainfall of 460 mm on 1 December was the highest in 100 years. The result has been widespread flooding with many parts of the conurbation under water. Over 250 people are feared dead, with many more made homeless. On Thursday Prime Minister of India Narendra Modi surveyed the submerged state capital and adjoining areas and announced an immediate relief of 300million USD for flood-hit Tamil Nadu. Other areas of Tamil Nadu and Andhra Pradesh are also affected by floodwater.

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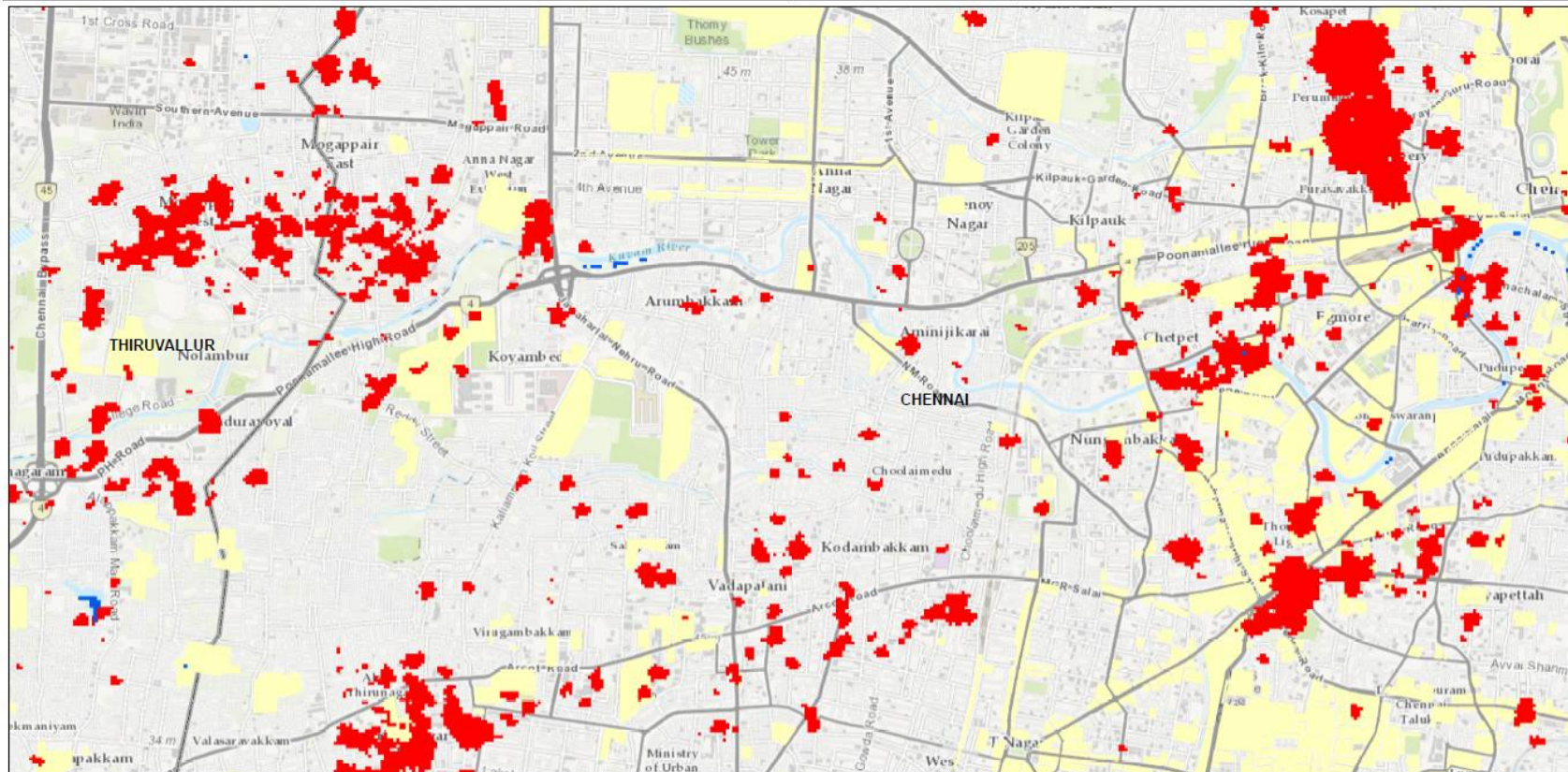
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Second Wave of Catastrophic Flooding in Chennai (Tamil Nadu), India



Last month saw Chennai's wettest November in a century. Home to 4.3 million people, the city's rainfall of 490 mm on 1 December was the highest in 100 years. The result has been widespread flooding with many parts of the conurbation under water. Over 250 people are feared dead, with many more made homeless. On Thursday Prime Minister of India Narendra Modi surveyed the submerged state capital and adjoining areas and announced an immediate relief of 30million USD for flood-hit Tamil Nadu. Other areas of Tamil Nadu and Andhra Pradesh are also affected by floodwater.

IWMI in cooperation with Sentinel Asia in particular Japan Aerospace Exploration Agency (JAXA) activated disaster charter for December 03, 2014 at 16:43hours using ALOS-2 PALSAR-2 images. The images clearly highlight areas of standing water in and around Chennai city. Approximately 25km² is still inundated by extreme rainfall between Nov 30 and Dec 2, 2015.

Overflowing rivers and lakes pose added threats to India's fourth largest city as the number of troops deployed in rescue effort is doubled to 4,000. Thousands of people were trying to escape flooding in the Indian city of Chennai on 04 Dec Friday amid fears that further heavy rain will cause more destruction. "The rain is not a problem now, it is the overflowing river and 30 lakes that continue to flood four districts," a senior home ministry official in New Delhi told Reuters.

The maps can be very well used by NDRF, Flood Control Room and aid agencies to understand the areas where floods are receding and standing water to prepare emergency response maps in support of relief and rescue operations.

Legend

Flood Date : 03 December 2015
Satellite Image : ALOS-2 PALSAR-2

03 Dec. 2015 (Post Disaster)

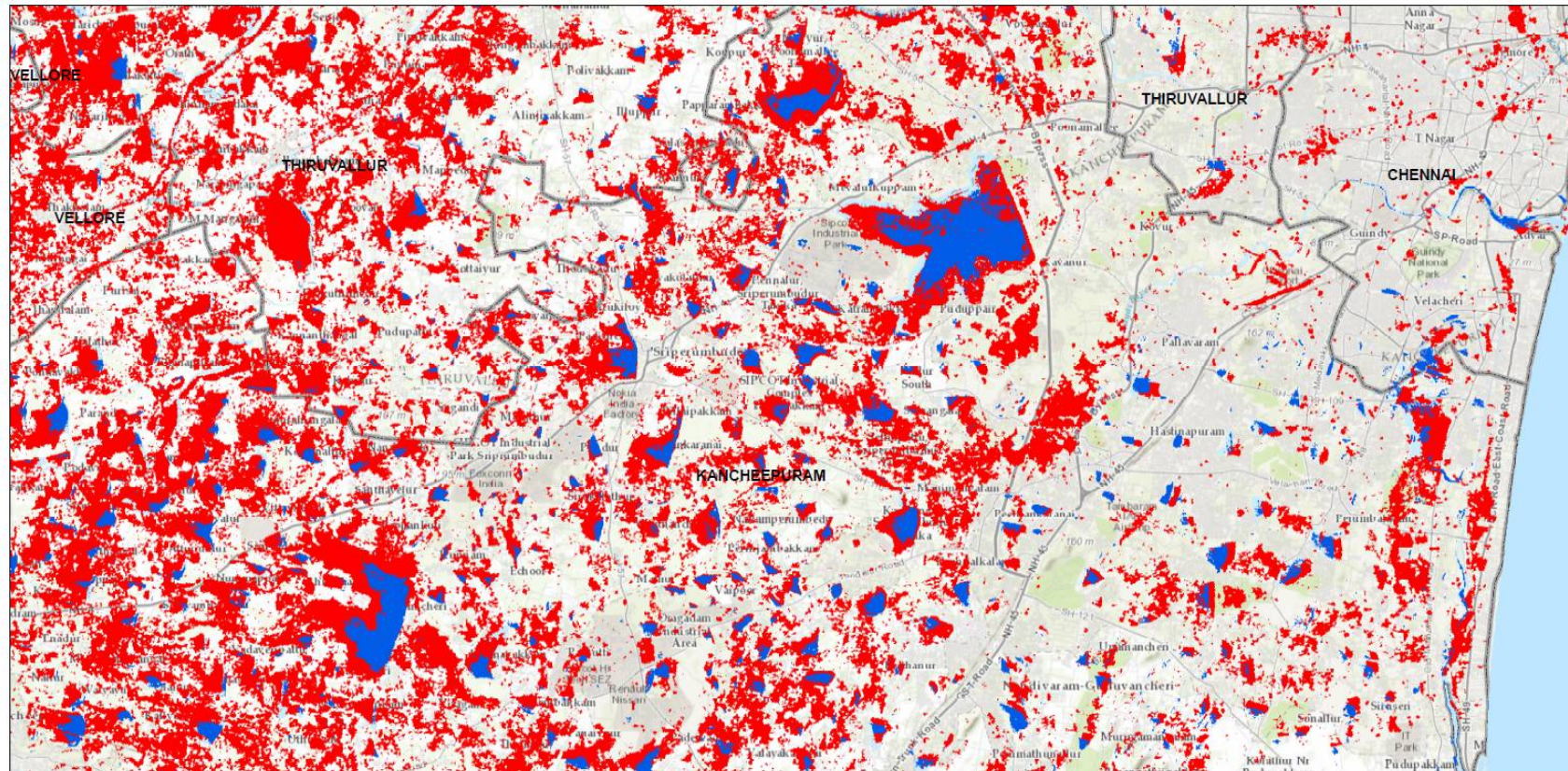
- River/Permanent water
- Roads
- Railways
- Waterways
- Urban / Land Use
- District boundary
- Places

Map Prepared by:

Data Provided by:



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2015 Flood in Tamil Nadu & Andhra Pradesh



Source: IBNLIVE



Source: bdnews



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Rains, floods kill 269 in Tamil Nadu, 54 in Andhra

By IANS | Thursday, December 3, 2015 - 13:45



A water-secure world

www.iwmi.org

Second Wave of Catastrophic Flooding in Chennai (Tamil Nadu), India



Last month saw Chennai's wettest November in a century. Home to 4.3 million people, the city's rainfall of 490 mm on 1 December was the highest in 100 years. The result has been widespread flooding with many parts of the conurbation under water. Over 250 people are feared dead, with many more made homeless. On Thursday Prime Minister of India Narendra Modi surveyed the submerged state capital and adjoining areas and announced an immediate relief of 300million USD for flood-hit Tamil Nadu. Other areas of Tamil Nadu and Andhra Pradesh are also affected by floodwater.

IWMI in cooperation with Sentinel Asia in particular Japan Aerospace Exploration Agency (JAXA) activated disaster charter for December 03, 2014 at 16:43hours using ALOS-2 PALSAR-2 images. The images clearly highlight areas of standing water in and around Chennai city. Approximately 25sq.km is still inundated by extreme rainfall between Nov 30 and Dec 2, 2015. Further the JAXA made new satellite acquisition for December 09, 2015 to get update on the flood condition. The areas around Chennai namely Thiruvallur, Ponneri are still with flood water.

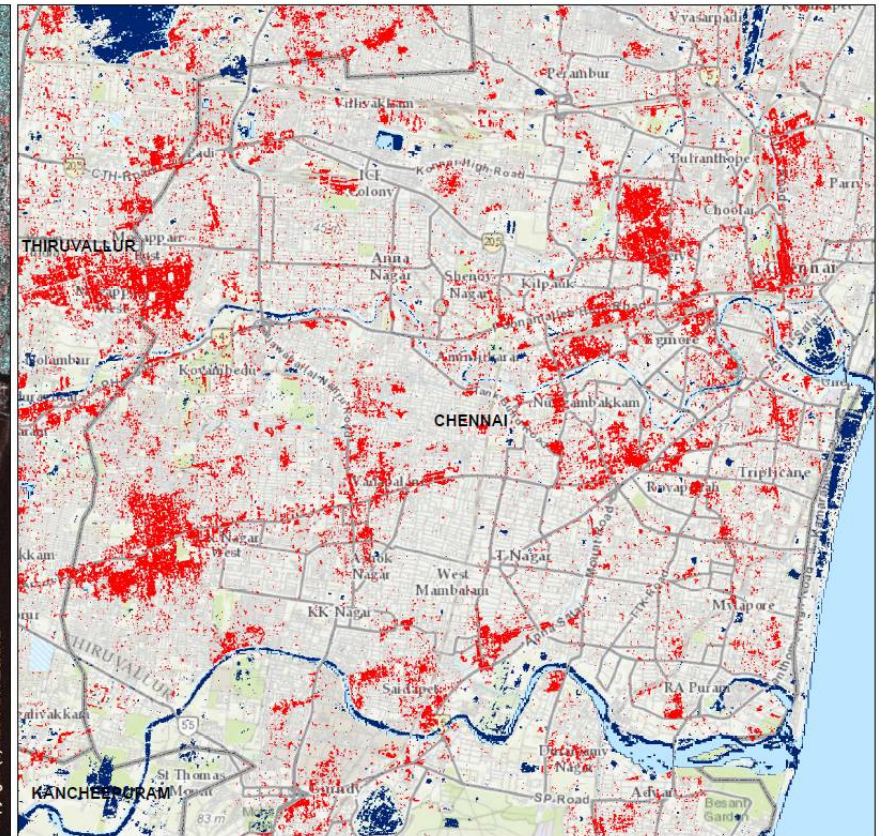
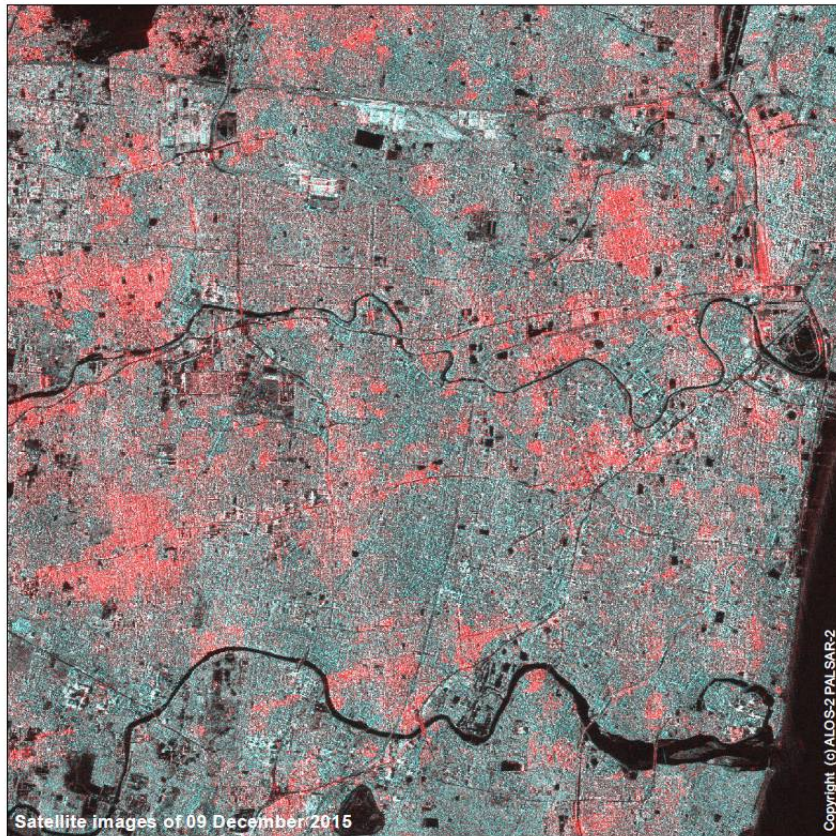
The maps can be very well used by NDRF, assessment on flood insured losses and aid agencies to understand the areas where floods are receding and standing water to prepare emergency response maps in support of relief and

Legend





- Flood Date : 09 December 2015
Satellite Image : ALOS-2 PALSAR-2
- 09 Dec. 2015 (Post Disaster)
 - River/Permanent water
 - Roads
 - Railways
 - Waterways
 - Ocean
 - District boundary
 - Places

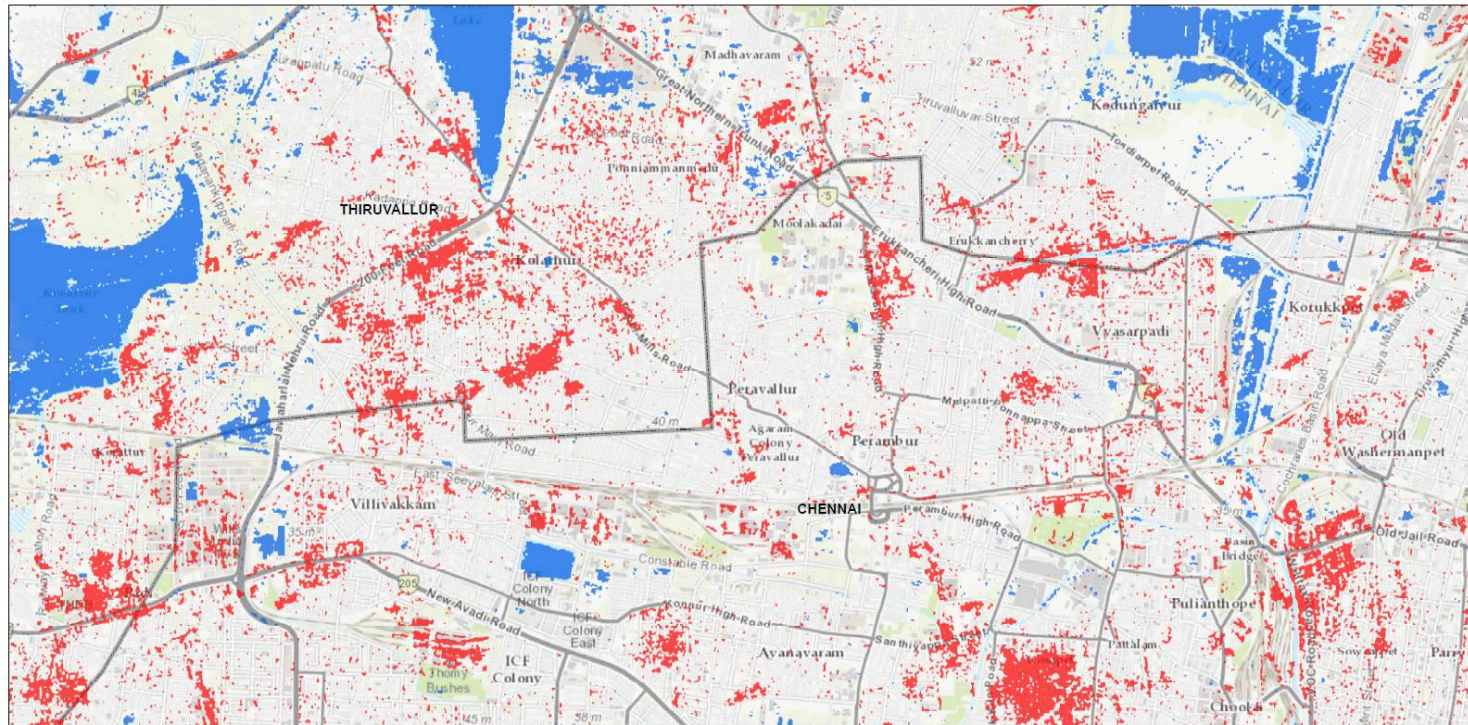


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Second Wave of Catastrophic Flooding in Chennai (Tamil Nadu), India

	<p>Last month saw Chennai's wettest November in a century. Home to 4.3 million people, the city's rainfall of 460 mm on 1 December was the highest in 100 years. The result has been widespread flooding with many parts of the conurbation under water. Over 250 people are feared dead, with many more made homeless. On Thursday Prime Minister of India Narendra Modi surveyed the submerged state capital and adjoining areas and announced an immediate relief of 300million USD for flood-hit Tamil Nadu. Other areas of Tamil Nadu and Andhra Pradesh are also affected by floodwater.</p> <p>IWMI in cooperation with Sentinel Asia in particular Japan Aerospace Exploration Agency (JAXA) activated disaster charter for December 03, 2014 at 10:43hours using ALOS-2 PALRSAR-2 images. The images clearly highlight areas of standing water in and around Chennai city. Approximately 28km² is still inundated by extreme rainfall between Nov. 30 and Dec 2, 2015.</p> <p>Overflowing rivers and lakes pose added threats to India's fourth largest city as the number of troops deployed in rescue efforts is doubled to 4,000. Thousands of people were trying to escape flooding in the Indian city of Chennai on 04 Dec Friday amid fears that further heavy rain will cause more destruction. "The rain is not a problem now, it is the overflowing river and 30 lakes that continue to flood four districts," a senior home ministry official in New Delhi told Reuters.</p> <p>The maps can be very well used by NDRF, Flood Control Room and aid agencies to understand the areas where floods are receding and standing water to prepare emergency response maps in support of relief and rescue operations.</p>	<p>Legend</p> <p>Flood Date : 09 December 2015 Satellite Image : ALOS-2 PALRSAR-2</p> <p>09 Dec. 2015 (Post Disaster)</p> <ul style="list-style-type: none"> ■ River/Permanent water ■ Roads ● Places Railways Waterways District boundary 	<p>Map Prepared by:  Data Provided by:  </p> <p>The depiction and use of boundaries, geographic names and related data shown in these maps are based on the sources they have been drawn from and quoted. These are neither error-free nor do they imply official endorsement or the position of IWMI.</p> <p>0 0.75 1.5 3 Kilometers</p>
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First Waves of Catastrophic Flooding in Chennai (Tamil Nadu), India



At least 165 people have lost their lives as heavy rains resulted in floods in Tamil Nadu. Chennai has been badly affected by floods as around 59 people have been killed in the capital so far. As per media reports, the incessant rains are caused due to a depression in the Bay of Bengal coast near Tamil Nadu. The heaviest rainfall in over a century caused massive flooding across Tamil Nadu, driving thousands from their homes, shutting auto factories and paralysing the airport in capital Chennai.

To determine the extent of severity in the flood affected districts in Tamil Nadu, Sentinel-1 satellite images referring to 24th November 2015 were obtained from European Space Agency to map the inundated areas. Dark areas in black referring to standing water. In total an estimated 567 sq.km were inundated of which the severely affected districts includes Cuddalore (360 sq.km), Nagapattinam (113 sq.km), Ariyalur (70 sq.km) and Perambalur (24 sq.km). Agriculture damage assessment at district level are Cuddalore (307 sq.km), Nagapattinam (82 sq.km), Ariyalur (50 sq.km) and Perambalur (16 sq.km).

Legend

- Flood Date : 24 November 2015
 Satellite Image : SENTINEL-1
- 24 Nov. 2015 (Post Disaster)
 - River/Permanent water
 - Roads
 - Railways
 - Waterways
 - Urban / Land Use
 - District boundary
 - Places

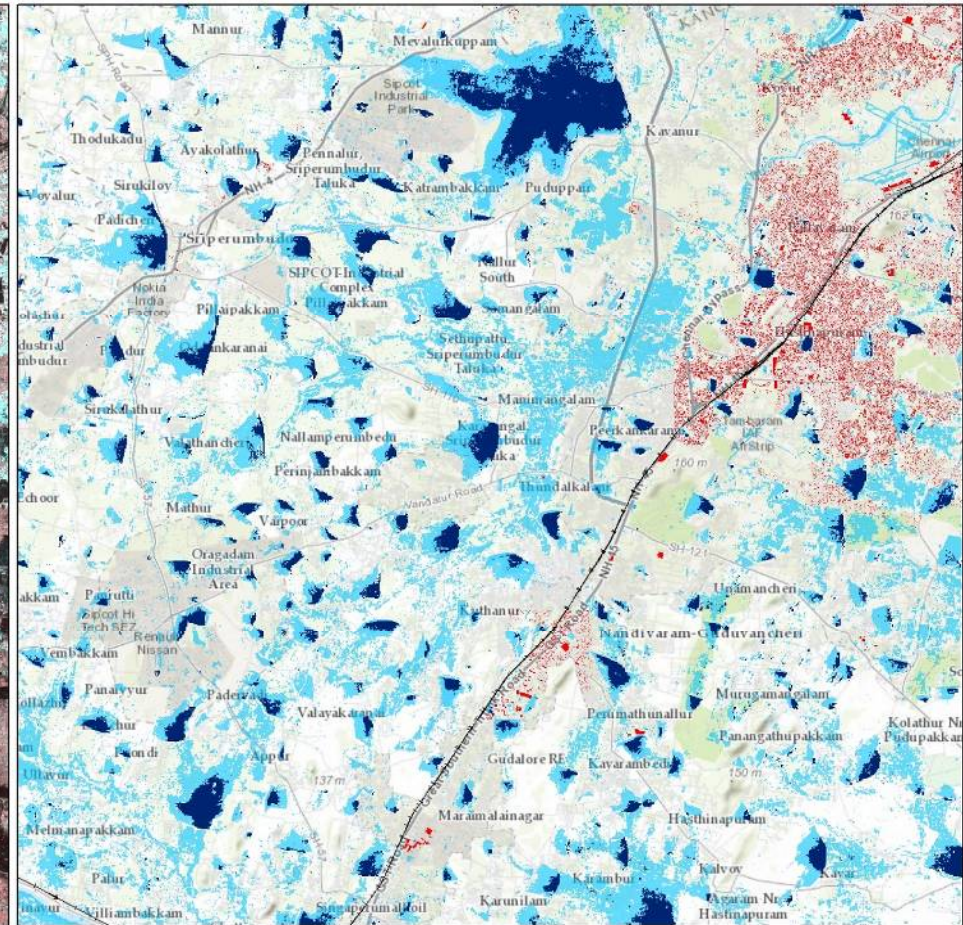
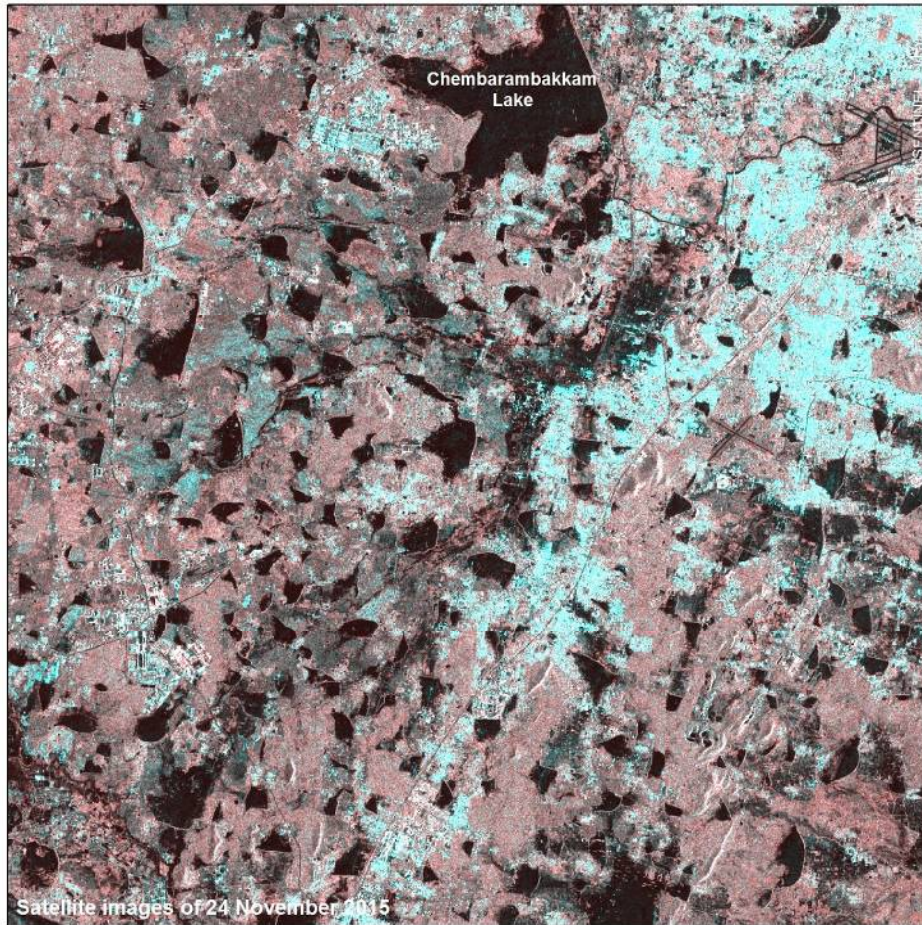
Map Prepared by:



Data Provided by:



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First Waves of Catastrophic Flooding in Chennai (Tamil Nadu), India



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Legend

- Flood Date : 24 November 2015
- Satellite Image : SENTINEL-1
- 24 Nov. 2015 (Post Disaster)
- River/Permanent water
- Roads
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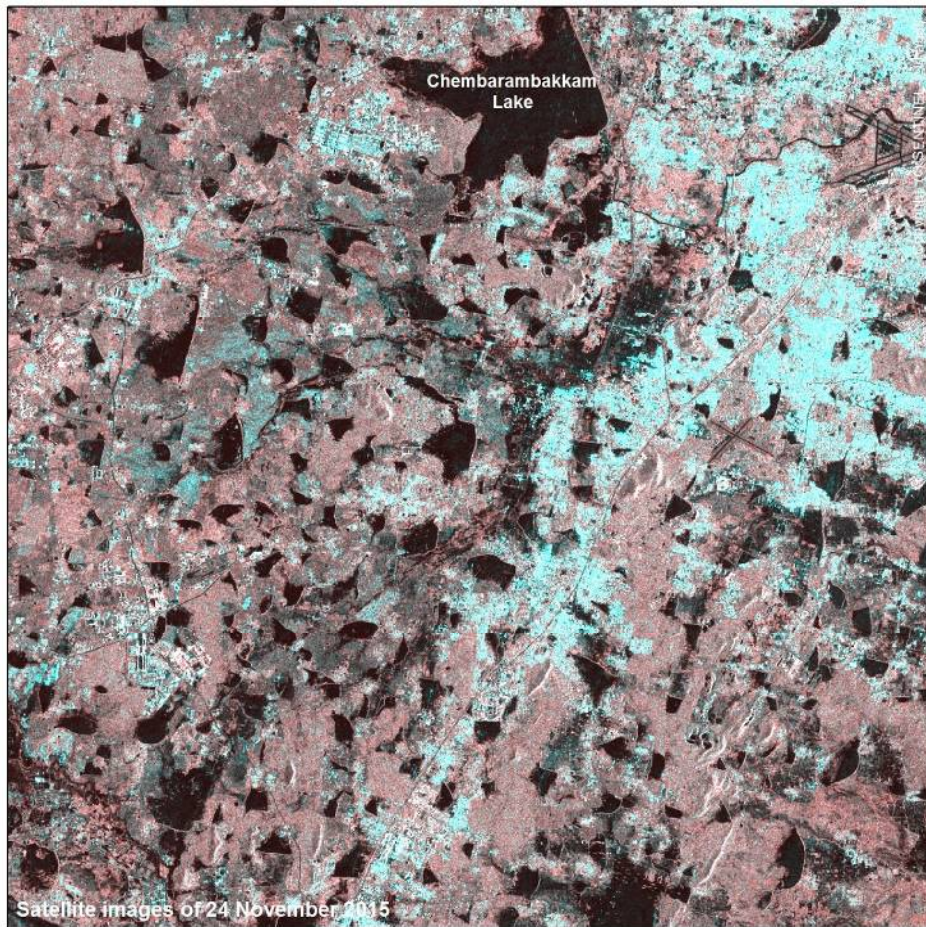
Map Prepared by:



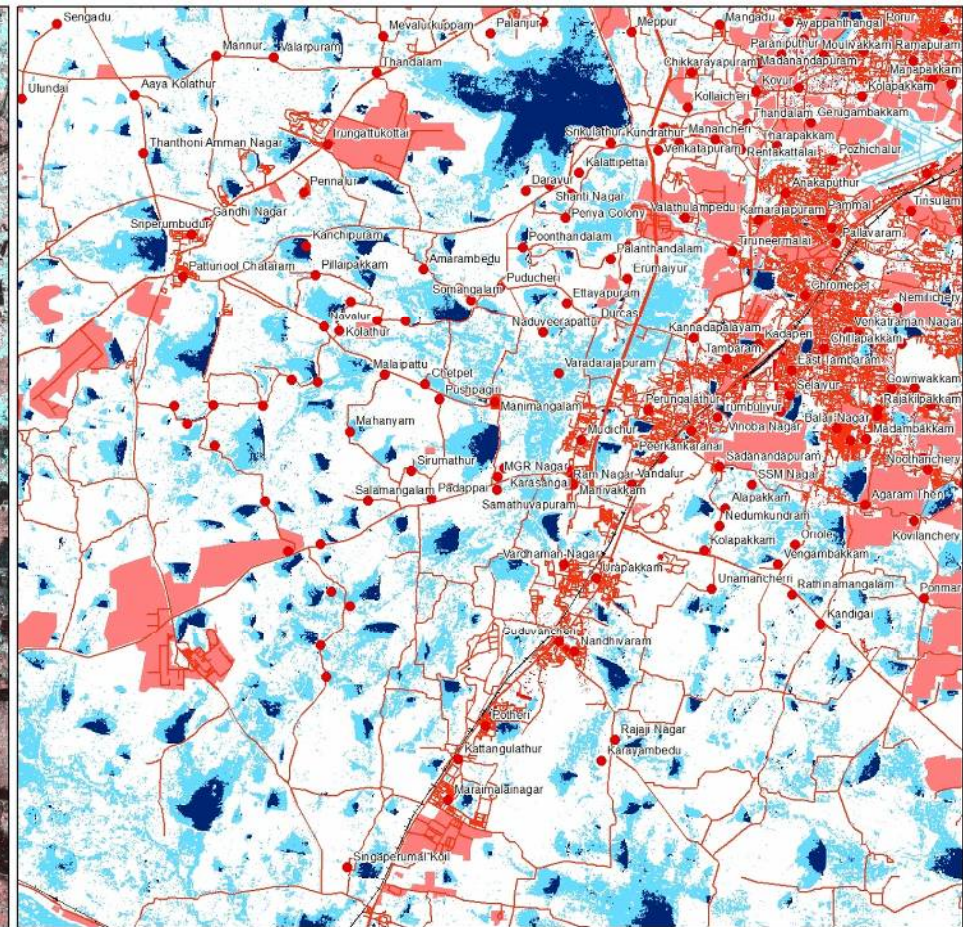
Data Provided by:



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Satellite images of 24 November 2015



Thanks