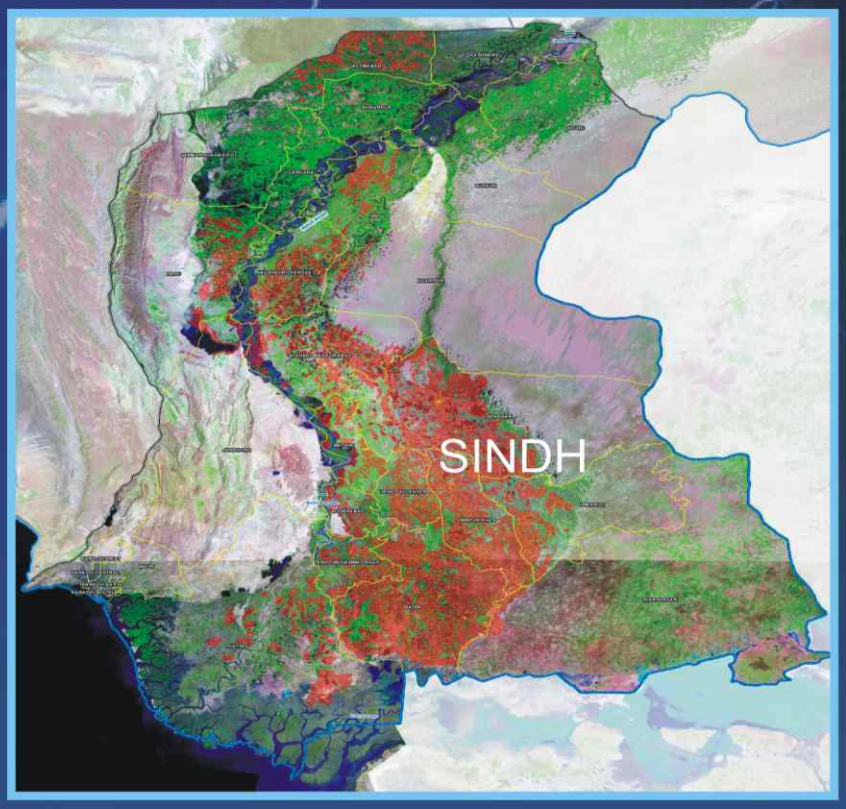


# PAKISTAN: FLOODS / RAINS 2011

Series No. 3

## RAPID CROP DAMAGE ASSESSMENT

December 31, 2011

SUPARCO
Pakistan Space & Upper Atmosphere Research Commission

Food and Agriculture Organization of the United Nations

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**ISBN: 978-969-9102-05-1**

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&
Pakistan Space & Upper Atmosphere Research Commission

# PREFACE

Pakistan experienced devastating floods during last two contiguous years of 2010 and 2011 which affected the agriculture sector on a large scale.

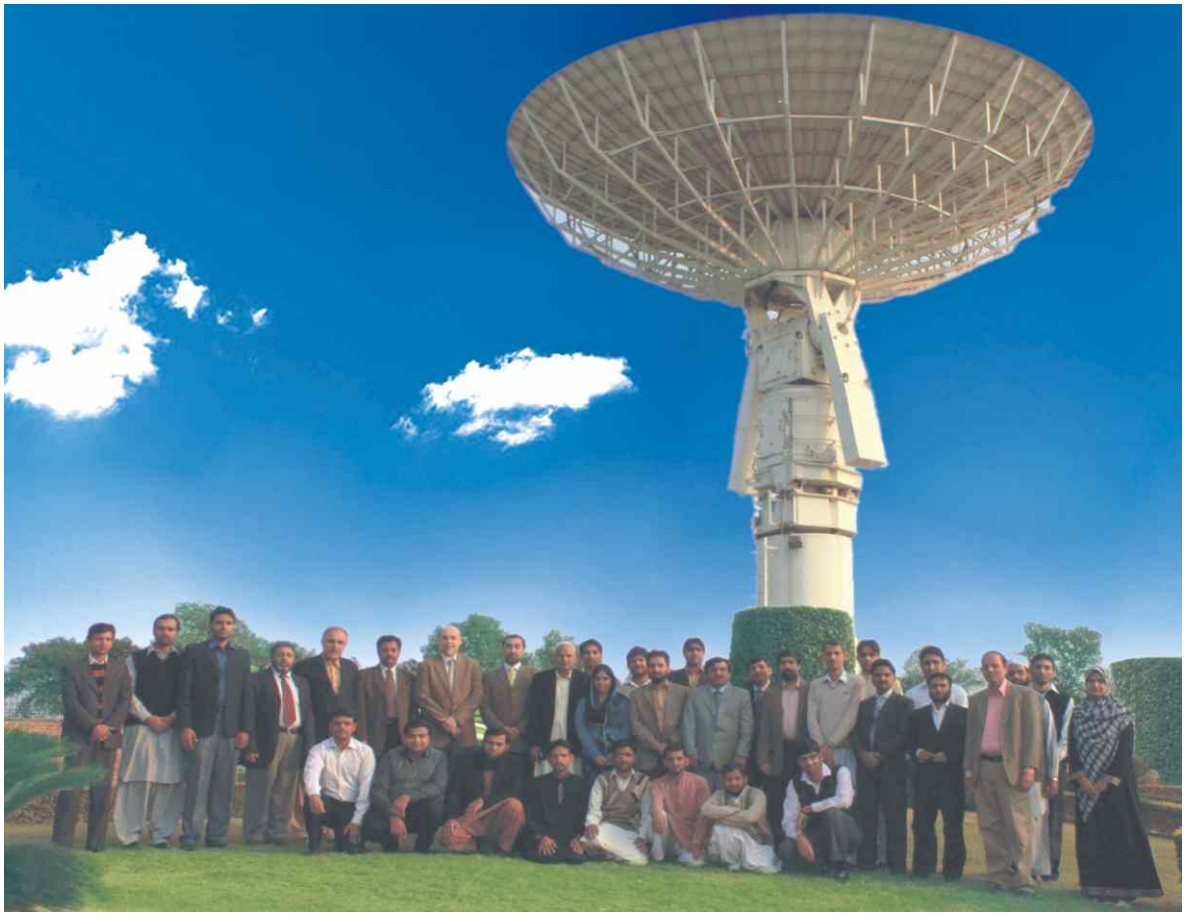
The Pakistan Space and Upper Atmosphere Research Commission (SUPARCO), the National Space Agency of Pakistan and the Food and Agriculture Organization of the United Nations (FAO) in the past years had already collaborated and demonstrated the expediency of satellite and ground based techniques, algorithms and procedures to estimate area, yield and production of crops.

FAO approached SUPARCO to monitor, gauge and report the flood situation and its impact on agriculture and economy. The scope of this work included updating and providing information on the flood risks, damages and facilitate the decision-making process for preparedness mitigation and implementation of the flood response programme which inter-alia included flooded area breakdown by crops and districts, infrastructure damage and estimation of recession dates. In addition, the work on vulnerability assessment based on population density and propensity to flood over time was also undertaken.

SUPARCO acquired medium and high resolution satellite data to carry out this work as well as embarked upon ground surveys. Analyses of these data were performed on daily basis. Time series data of high quality on mapping of this disaster and other facets was delivered proficiently.

FAO of the UN expresses sincere appreciation of the valuable material provided by SUPARCO. This information proved highly beneficial in ensuring an effective coordination between the Government of Pakistan and the International community in the context of prevalent floods in Sindh as well as long term flood risk preparedness related work. The information presented in the reports was of high value in assisting FAO to determine its flood response activities. Indeed, other UN agencies, NGOs and sectoral stakeholders frequently request updated information to assist in planning of their flood response. The information presented in the reports is also available on our website http:/www.fao.org.pk to benefit the planners, policy makers and other end users.

Alexander Müller
Assistant Director-General
Natural Resources Management and Environment Department



**SUPARCO team with Mr. John Latham, Senior Land and Water Officer, FAO, UN**

# Contents

| ACRONYM | DESCRIPTION |
|---|---|
| AJK | Azad Jammu and Kashmir |
| CRS | Crop Reporting Services |
| FAO | Food and Agricultural Organization, UN |
| GB | Gilgit Baltistan |
| Ha | Hectare |
| KP | Khyber Pakhtunkhwa |
| LoA | Letter of Agreement |
| MAF | Million Acre Feet |
| MINFA | Ministry of Food & Agriculture |
| MODIS | Moderate Resolution Imaging Spectroradiometer |
| NDVI | Normalized Difference Vegetation Index |
| PMD | Pakistan Meteorology Department |
| RIM | Regulated Irrigation Measurement |
| SPARCENT | Space Application & Research Center |
| SUPARCO | Pakistan Space & Upper Atmosphere Research Commission |

## 1. Summary

The monsoon of 2011 was manifested by remarkably high rainfall in South Asia. In Pakistan, there were wide spread rains. However the major downpour was in Sindh province where cumulative rainfall varied from 400 mm to around 1300 mm. These rains inundated large areas in Sindh and other provinces causing damage to crops, infrastructure and human settlements, thus adversely affecting national economy.[1]

The maximum rainfall during the period was from July 1 to September 30 , 2011. The peak rainfall was received in Mithi, Sindh. Being sandy area the rate of soil infiltration was very high. Therefore rate of runoff water was minimum. The other areas that received excessive rainfall were Mirpur Khas (866 mm), Badin (647 mm), Shaheed Benazir Abad (650 mm), Umerkot (552 mm), Dadu (485 mm) and Padidan (423 mm).

The gradient of the coastal areas in Sindh is almost nil. Therefore, the movement of water in the flooded areas took place at a very slow pace. For the first time, the residents of Thar Desert and its upper reaches had to be evacuated by boats. A large number of farmers lost their livestock on way to safe havens, non-availability of fodder and exertion. There was hardly a place in the severely affected area that was free of standing water.[2]

The maximum cumulative rainfall at various other locations in the country was Islamabad (962 mm), Lahore (703 mm), Malam Jabba (572 mm), Rawalakot (632 mm) rainfall and Barkhan (232 mm). These areas generally remained free of any major damage to crops although some losses did accrue to buildings and infrastructures especially in KP and Balochistan.

Satellite systems can provide rapid information on the effects of disasters caused by floods and other calamities. Given the advantage of temporal coverage, it is possible to carry out effective rapid mapping of disaster stricken areas. Furthermore, timely use of satellite data can assist in disaster relief, early recovery and rehabilitation process.

[1] SUPARCO and FAO signed a Letter of Agreement (LoA) on July 31 , 2011 to develop series of timeline documents to monitor the floods of 2011. SUPARCO, using geospatial cum ground based data prepared and submitted three reports to FAO. The reports start from August 08, 2011 onwards. The period covered ends on August 23, 2011 for the first report, September 03, 2011 for the second report and September 20, 2011 for the third report. The current report is fourth in series and covers period up to December 31, 2011.

[2] The initial reports covered the districts of Mirpurkhas, Tando Allah Yar, Umerkot, Badin, Tando Muhammad Khan, Sanghar, and Thatta. The report covers eight more districts of Sindh province i.e. Dadu, Matiari, Hyderabad, Tharparkar, Nausharo Feroze, Khairpur, Jacobabad and Jamshoro. Inundation in three districts of Balochistan i.e. Jhal Magsi, Nasirabad and Jafferabad and three districts of Punjab i.e. Vehari, Kasur and Bahawalnagar are also part of this report.

SUPARCO monitored the flooded areas using 250 m MODIS sensors onboard Aqua and Terra satellites on daily basis and high resolution satellite imagery from SPOT 4 & 5. In addition, ground validation was performed by field surveys in the flood affected districts to assess crop damage.

Cotton crop in the affected areas was mostly damaged. Some of the crop that survived would not withstand standing water for extended period of time. The first picking of cotton was carried prior to rains. The total loss to cotton in affected districts is estimated at 80 percent which is about 2.239 million bales. The textile sector came under high speculations on the issue of cotton crop damages. Opinion generally remained divided, creating chaos in the sector. Sugarcane crop remained secured to a great extent from the ravages of flooding. Sindh Government was advised to assure commencement of sugar crushing at an early date to avoid prolonged submergence of sugarcane.

Chilli crop also demands good drainage. Chilli growing areas received the first heavy spell of rain on August 11, 2011. Bulk of the crop suffered from defoliation and senescence. Some of the crop was picked prior to rains and some also survived flooding. The crop area that suffered damage is about 90 percent. As some of the crop picking was carried out prior to rains, the production damage was 78.5 thousand tons out of the total of 155 thousand tons.

The sugarcane crop generally escaped damage and is likely to benefit from the moisture of soil. Rice crop did not suffer much damage except in Badin and Thatta districts where LBOD funneled large amount of water into the areas. The extent of damage was around 0.284 million tons.

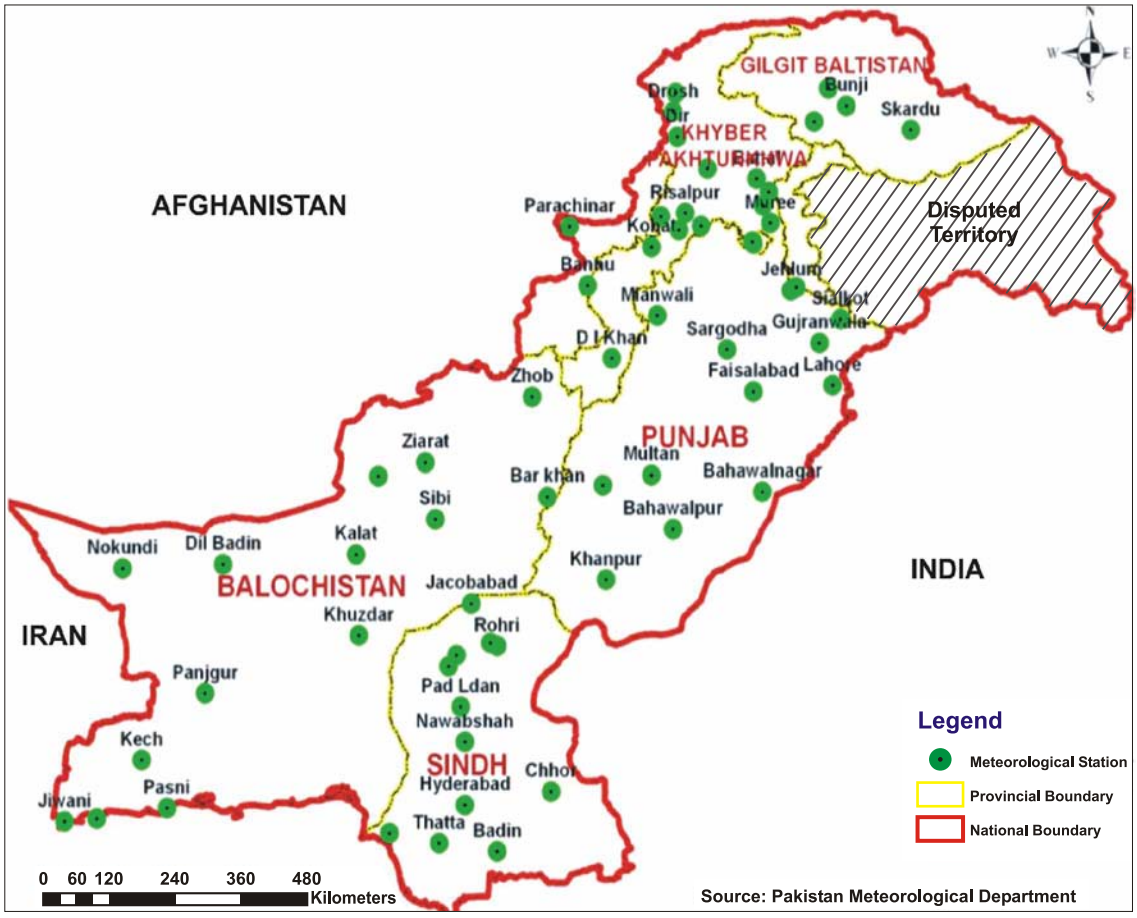
Onion and tomato crops in the affected areas were completely washed out. Re-sowing a full scale crop could not be undertaken due to standing water in the fields. However 10-15 percent of the crop is expected to be re-sown. Water drainage may speed up during low sea tidal activity. Estimated loss of onion is 356 thousand tons from a crop of 660 thousand tons and tomato 70 thousand tons out of 561 thousand tons.

Pakistan is likely to face acute shortage of onions, chillies, tomatoes and other vegetables in winter. The farmers cultivating off season vegetables can benefit from these gaps in supply. Government of Pakistan would have to take appropriate measures to ensure steady supply of these minor crops of daily use.

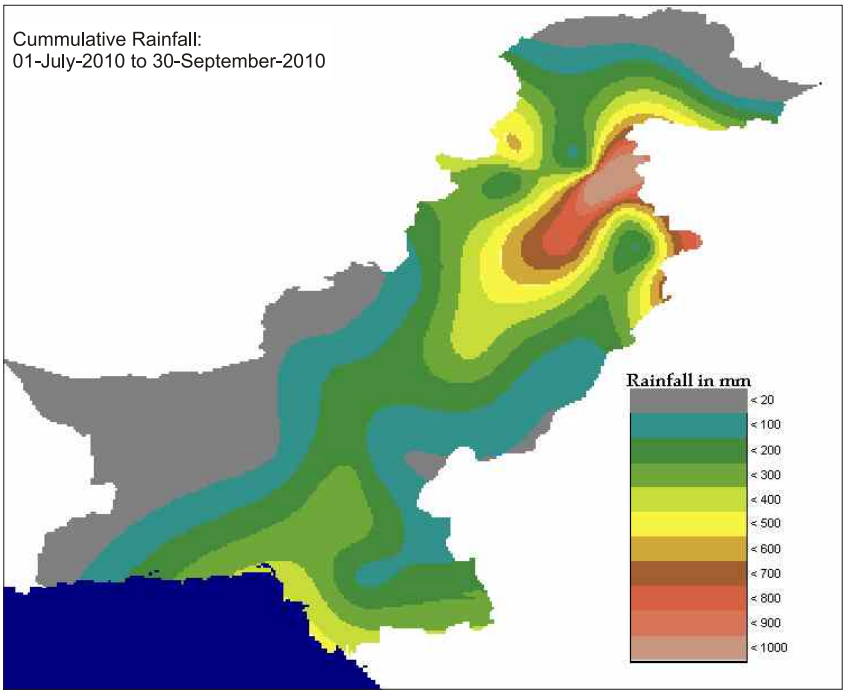
There was a massive displacement of human beings and livestock. A large number of buffaloes, donkeys and other valuable livestock were lost.

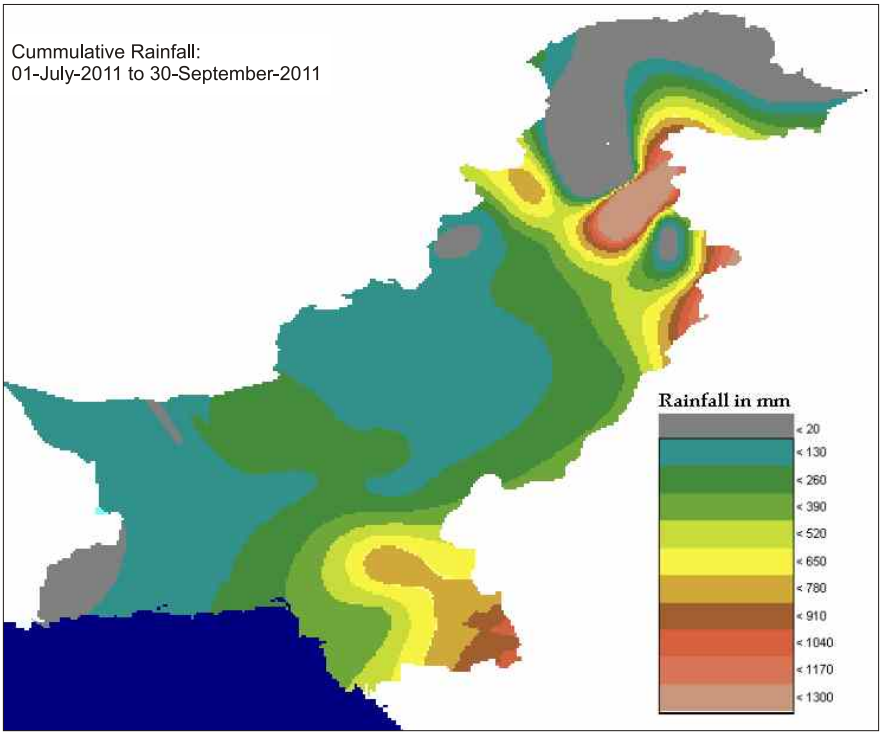
## 2. Rainfall and Flash Floods

The summer rainfall in Pakistan is generally during the periods of July to September. Monsoon from the Bay of Bengal is the main source of these rains. However, the mid latitude westerly disturbances, at some times, also contribute on summer rainfalls. The Rainfall data is observed by metrological stations installed by Pakistan Metrological Department (PMD) all across the country.



## Cumulative rainfall for the year 2010 and 2011 is as under:



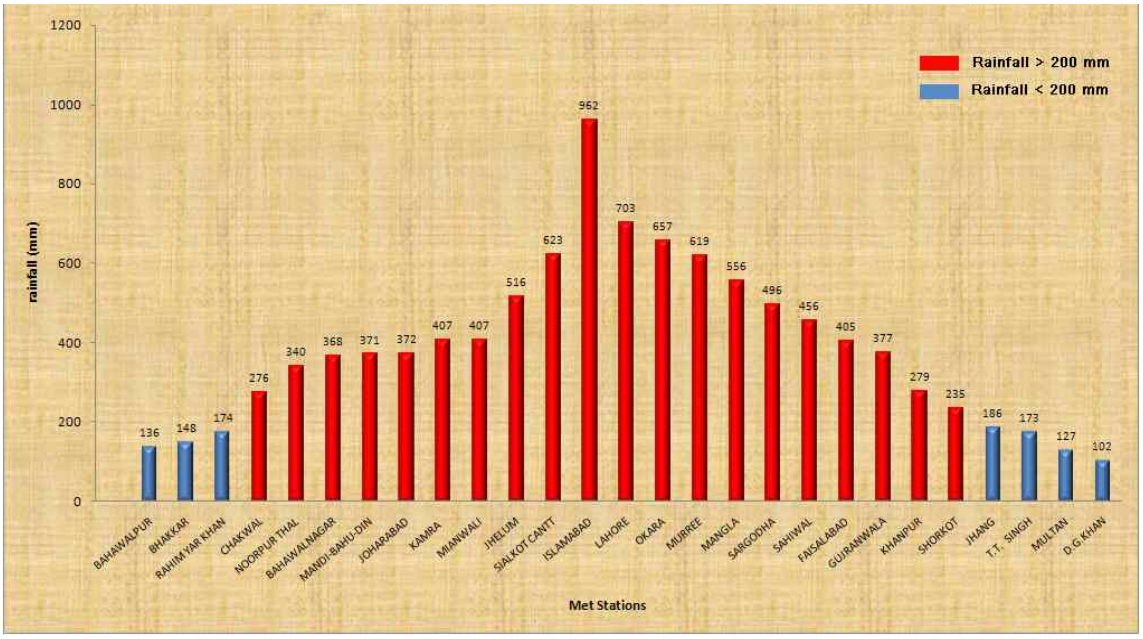



## Province wise detail of rainfall data is as follows:

### a. Punjab

In the Punjab, the highest rainfall of the order of 962 mm was received in Islamabad. About 20 stations in Punjab received rainfall higher than 200 mm, 17 stations received more than 300 mm and 12 stations got more than 400 mm rainfall. Low level floods were observed in the rivers of Chenab, Ravi and Sutlej. A high tide of 70,000 cusecs passed through Sutlej on August 16-17 and about 82,000 cusecs on August 24, 2011. The extent of loss of crops in the Punjab was minimum and was therefore manageable.

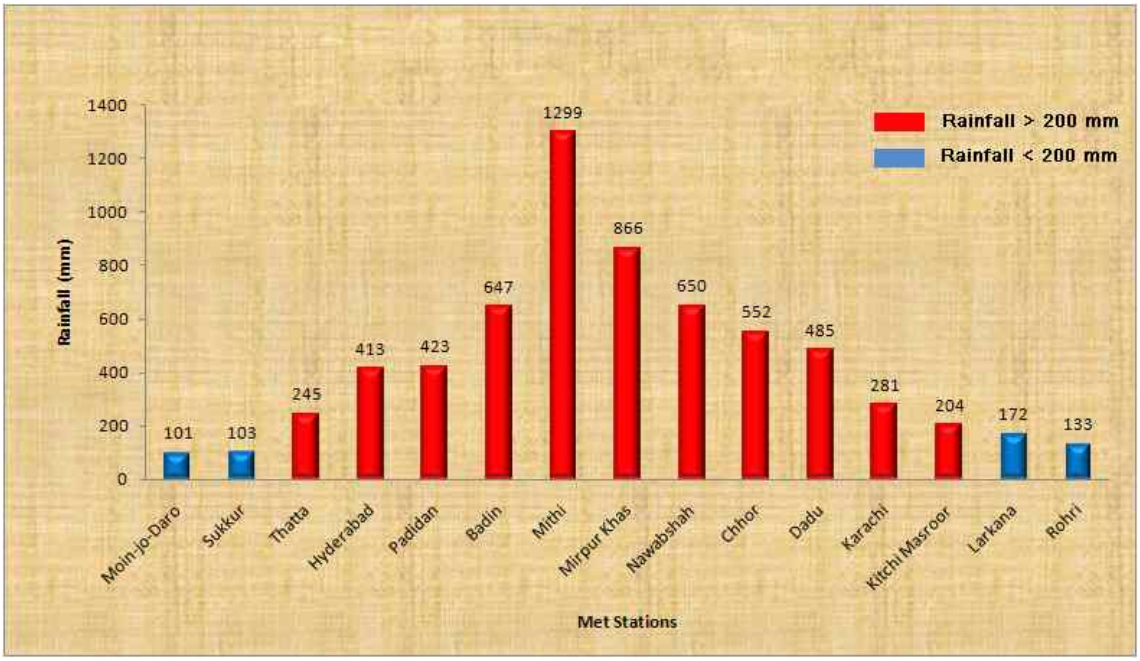
**Punjab: Rainfall from July 1 to September 30, 2011**




| Pubjab: Rainfall from July 1 to September 30, 2011 | | |
|---|---|---|
| **Rainfall range** | **No. of Met Stations** | **Met Stations** |
| More than 200 mm | 20 | Chakwal, Noor Pur Thal, Bahawalnagar, Mandi-Bha-u-din, Joharabad, Kamra |
| | | Mianwali, Jhelum, Sialkot, Islamabad, Lahore, Okara, Murree, Mangla, Sargodha |
| | | Sahiwal, Gujranwala, Faisalabad, Kanpur, Shorkot |
| More than 300 mm | 17 | Noor Pur Thal, Bahawalnagar, Mandi-Bha-u-din, Joharabad, Kamra, Mianwali |
| | | Jhelum, Sialkot, Islamabad, Lahore, Okara, Murree, Mangla, Sargodha, Sahiwal |
| | | Gujranwala, Faisalabad |
| More than 400 mm | 12 | Kamra, Mianwali, Jhelum, Sialkot, Islamabad, Lahore, Okara, Murree, Mangla |
| | | Sargodha, Sahiwal, Faisalabad |

## b. Sindh

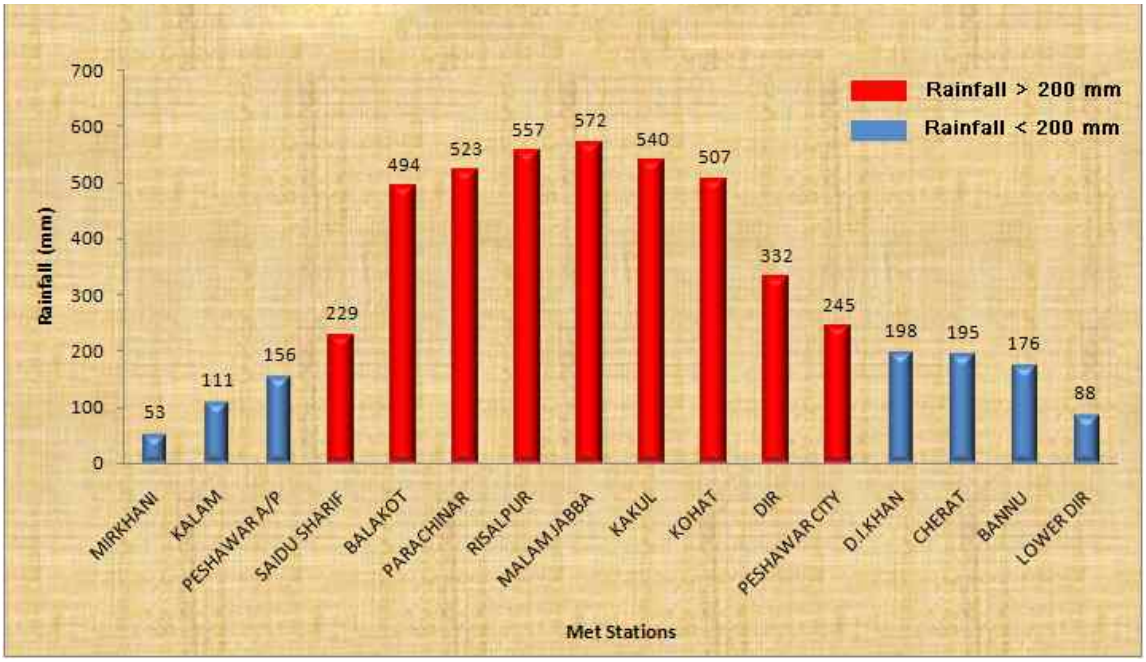
### Sindh: Rainfall from July 1 to September 30, 2011




| Sindh: Rainfall from July 1 to September 30, 2011 | | |
|---|---|---|
| **Rainfall range** | **No. of Met Stations** | **Met Stations** |
| More than 200 mm | 11 | Thatta, Hyderabad, Chhor, Padidan, Badin, Mithi, Nawab Shah, Mirpur Khas, Dadu, Karachi, Kechi Masroor |
| More than 300 mm | 08 | Hyderabad, Padidan, Badin, Mithi, Nawab Shah, Mirpur Khas, Chhor, Dadu |
| More than 400 mm | 08 | Hyderabad, Padidan, Badin, Mithi, Nawab Shah, Mirpur Khas, Chhor, Dadu |

## c. Khyber Pakhtunkhwa (KP)

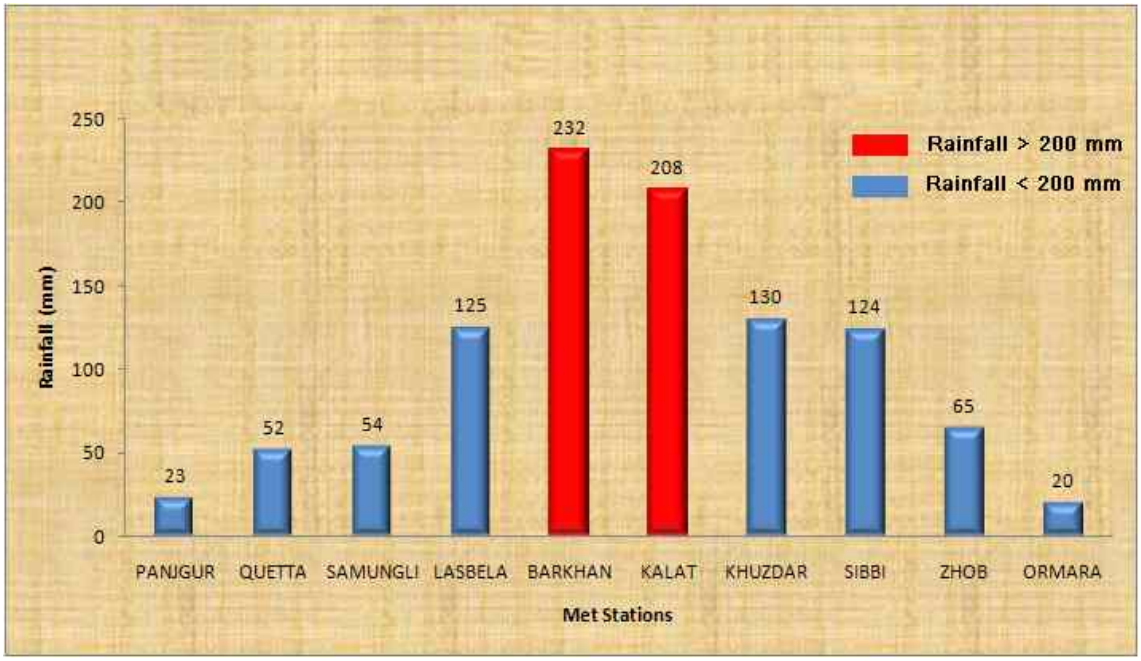
### KP: Rainfall from July 1 to September 30, 2011




| KP: Rainfall from July 1 to September 30, 2011 | | |
|---|---|---|
| **Rainfall range** | **No. of Met Stations** | **Met Stations** |
| More than 200 mm | 09 | Said Sharif, Balakot, Parachinar, Risalpur, Malam Jabba, Kakul, Kohat, Dir, Peshawar |
| More than 300 mm | 07 | Balakot, Parachinar, Risalpur, Malam Jabba, Kakul, Kohat, Dir |
| More than 400 mm | 06 | Balakot, Parachinar, Risalpur, Malam Jabba, Kakul, Kohat |

## d. Balochistan

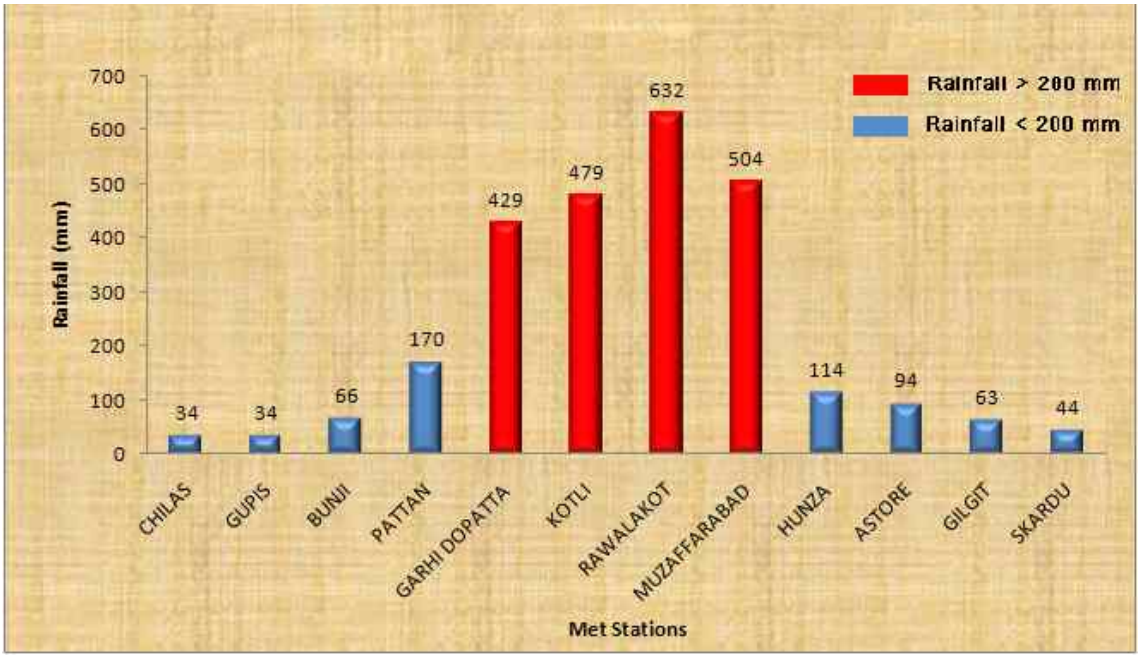
### Balochistan: Rainfall from July 1 to September 30, 2011




| Balochistan Rainfall from July 1 to September 30, 2011 | | |
|---|---|---|
| **Rainfall range** | **No of Met Stations** | **Met Stations** |
| More than 200 mm | 02 | Kalat, Barkhan |
| More than 300 mm | NIL | NIL |
| More than 400 mm | NIL | NIL |

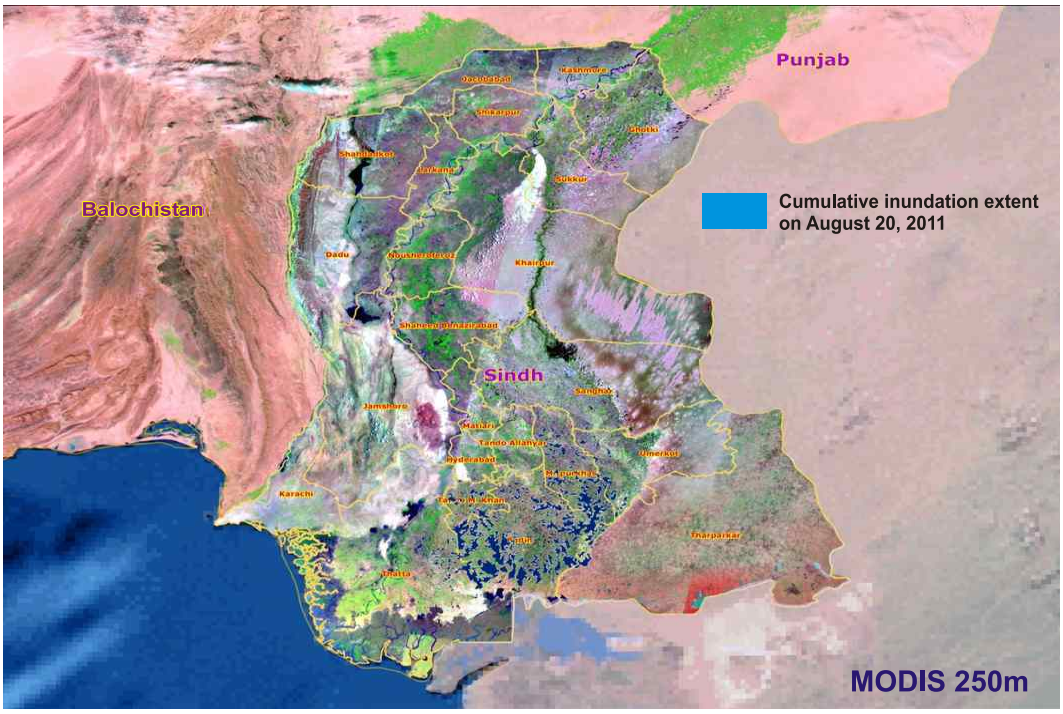
## e. Gilgit Baltistan / Azad Kashmir

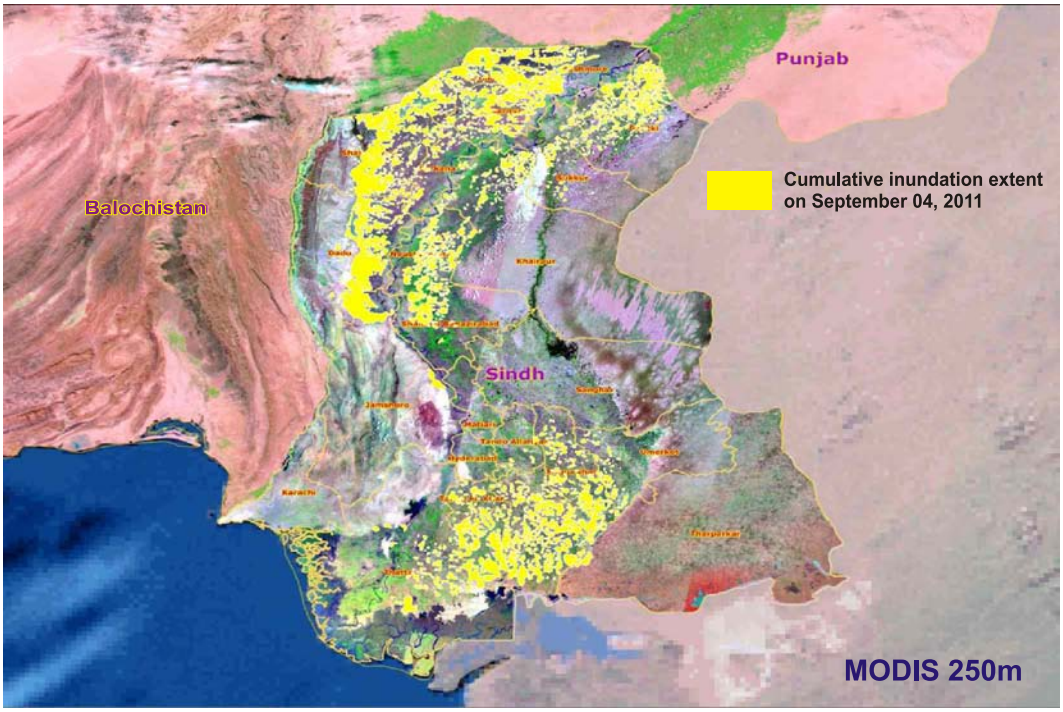
### GB/AK: Rainfall from July 1 to September 30, 2011

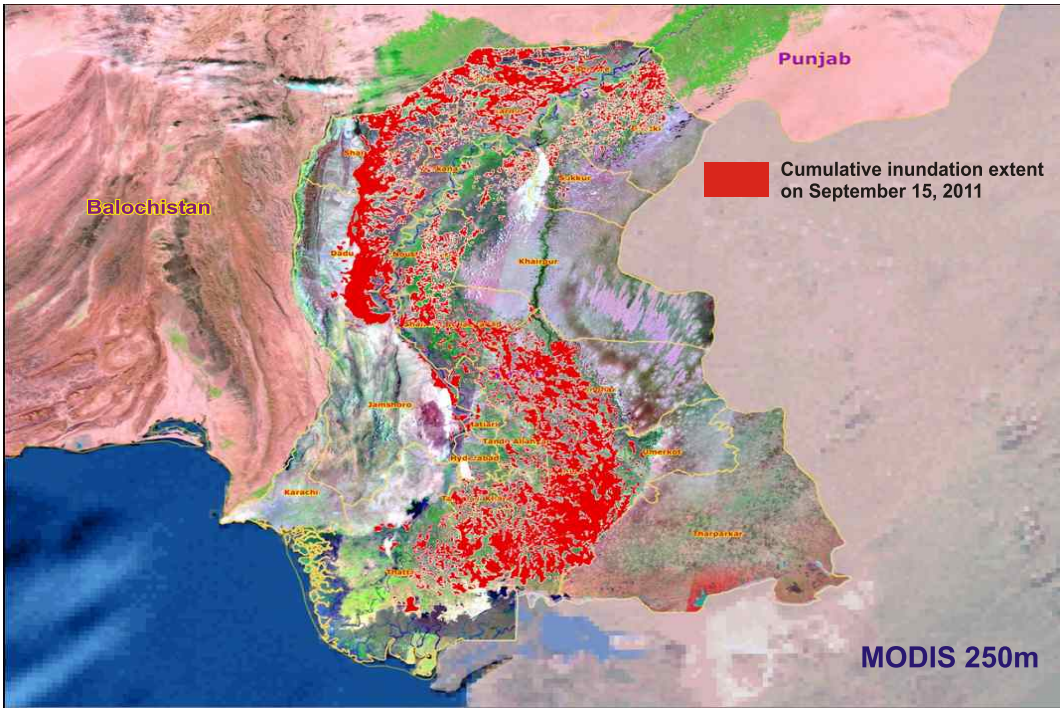


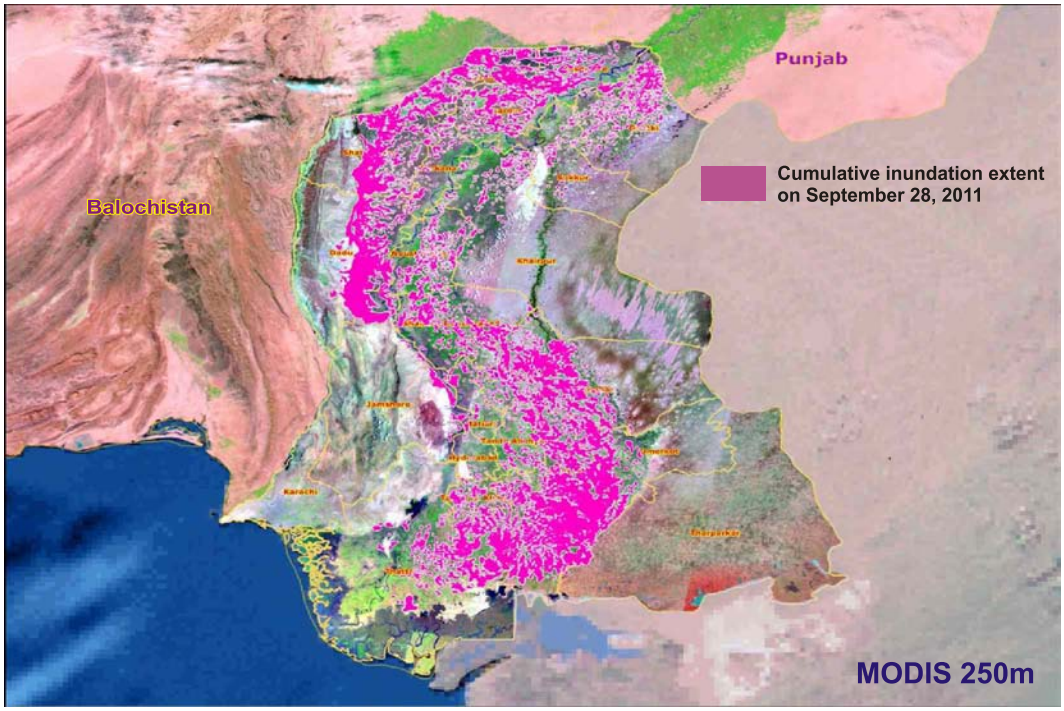

| GB/AK: Rainfall from July 1 to September 30, 2011 | | |
|---|---|---|
| **Rainfall range** | **No of Met Stations** | **Met Stations** |
| More than 200 mm | 04 | Gari Dopatta, Kotli, Rawalakot, Muzafarabad |
| More than 300 mm | 04 | Gari Dopatta, Kotli, Rawalakot, Muzafarabad |
| More than 400 mm | 04 | Gari Dopatta, Kotli, Rawalakot, Muzafarabad |

## Temporal, Cumulative inundation extent




Punjab
Balochistan
Cumulative inundation extent
on September 15, 2011
MODIS 250m


Punjab
Balochistan
Cumulative inundation extent
on September 28, 2011
MODIS 250m

## 3. Crop Situation

During the flood, SUPARCO updated the inundation maps everyday. The district-wise inundation data were compiled daily. The information gathered on agricultural areas was categorized by crop areas of cotton, sugarcane, rice and other crops.

Two field validation campaigns were carried out in eight severely affected districts of Sindh (Hyderabad, Mirpur khas, Umerkot, Badin, Tando Allahyar, Tando Muhammad Khan, Thatta and Shaheed Benazir Abad). The survey team assessed the accuracy of classification results.

Sugarcane, cotton, rice, maize, fodder, vegetables, fruits and spices are generally the major crops of Kharif season. The description of the status of important Kharif crops is as follows:

### Cotton Crop

Cotton crop is predominantly sown in the Punjab and Sindh. The crop escaped damage in the Punjab and the prospects of an excellent crop in this province are bright. In Sindh, large volumes of water would be standing up to the end of december. The cotton crop under standing water has been mostly damaged in these areas.

The farmers were able to carry out one out of five pickings prior to rains around August 11, 2011. This constituted 20 percent of the crop picked.

About 5-10 percent of cotton crop escaped damage particularly in Kunri. The first phase in the demise of plants is an acute defoliation process. The plants lose leaves and photosynthetic activity stops. The plant ultimately dies. Despite that the bolls on the defoliated plants have matured. The current loss is estimated at 65 percent. However this may further increase to 80 percent as water is still standing in the root zone of the crop.

The rains have badly affected the quality of phutti (seed cotton) and are likely to get discounted prices for this low quality cotton. The extent of damage is estimated at about 2.239 million bales. The district wise details are as follows:

## Damage to Cotton Crop

| District | Sindh | | | |
|---|---|---|---|---|
| | 000 ha | Kg/ha | Damage factor | 000 bales |
| **Sindh** | | | | |
| Tando Muhammad Khan | 8.1 | 1430 | 0.8 | 54.51 |
| Badin | 33.4 | 1508 | 0.8 | 237.02 |
| Thatta | 7.2 | 1288 | 0.8 | 43.64 |
| Mirpurkhas | 86.4 | 1152 | 0.8 | 468.39 |
| Tando Allah Yar | 16.6 | 1376 | 0.8 | 107.49 |
| Umerkot | 45.4 | 1015 | 0.8 | 216.85 |
| Sanghar | 124.7 | 1319 | 0.8 | 774.02 |
| Shaheed Benazir Abad | 37.1 | 1060 | 0.8 | 185.06 |
| Hyderabad | 1.43 | 1409 | 0.8 | 9.49 |
| Dadu | 2.13 | 893 | 0.8 | 8.97 |
| Matiari | 6.85 | 1393 | 0.8 | 44.90 |
| KhairPur | 5.92 | 965 | 0.8 | 26.88 |
| Jamshoro | 2.34 | 965 | 0.8 | 10.61 |
| Naushahro Feroze | 8.47 | 1093 | 0.8 | 43.57 |
| Tharparkar | 0.03 | 1045 | 0.8 | 0.16 |
| Jacobabad | 0.00 | 0 | 0.8 | 0.00 |
| Total | 369.3 | 1284.0 | 0.8 | 2231.6 |
| **Punjab** | | | | |
| Kasur | 0 | 0 | 0 | 0.00 |
| Bahawalnagar | 2.5 | 740 | 0.4 | 4.34 |
| Vehari | 1.8 | 645 | 0.4 | 2.77 |
| Total | 4.3 | 700 | 0.4 | 7.11 |
| **Balochistan** | | | | |
| Nasirabad | 0 | 0 | 0 | 0 |
| Jaffarabad | 0 | 0 | 0 | 0 |
| Jhal Magsi | 0 | 0 | 0 | 0 |
| Total | 0 | 0 | 0 | 0 |
| **Grand Total** | **373.6** | **1273** | **0.8** | **2238.7** |

## Damage to Cotton Crop

Tando Allah Yar

Hyderabad

Mirpur Khas


Mirpur Khas

Badin

Badin

Given the devolution of Ministry of Food and Agriculture, there is no central platform to provide a first hand, nonstop, direct supply of time series information on crops. This makes the policy making decisions in agriculture including textile, very complicated. In such circumstances, the textile sector has undergone high speculations, on the issue of the quantum of cotton available. The opinions generally remained divided, funneling confusion and stimulating price rise.

## Chilies Crop

Chilies are mainly sown in Sindh, Punjab and Baluchistan. Hot dishes are generally not a constituent of KP food basket. Therefore the cultivation of this crop did not pick in this province. The chilies are sown both in Kharif and Rabi season in Sindh as winter in this province is generally mild and frost free. In other provinces, chilies are sown during summer when the ambient temperatures are generally hot to moderate. The area under chilies was 78.5 thousand ha and the crop production was 188.9 thousand tons during the year 2009-10.The share of provinces in chilies production is: Sindh 91.5 percent, Punjab 4.7 percent and Balochistan 3.3 percent. The share of Kharif chilies is two third and Rabi chilies are one third. Chilies generally require well drained fields. The crop is sensitive to continued flooding. The incidence of fusarium spores in water can become lethal and threatening. Assessment of damage is as follows:


Damaged chilies fields in Mirpur Khas

### Damage to Autumn Crop of Chillies 2011-12

| District | Area | Yield | Factor | Production |
|---|---|---|---|---|
| | 000 ha | kg/ha | Damage | 000 tons |
| Tando Muhammad Khan | 0.20 | 2500 | 0.5 | 0.25 |
| Badin | 16.50 | 2145 | 0.5 | 17.70 |

| | | | | |
|---|---|---|---|---|
| **Thatta** | 6.70 | 2075 | 0.5 | 6.95 |
| **Mirpurkhas** | 13.10 | 3298 | 0.5 | 21.60 |
| **Tando Allah Yar** | 0.90 | 1444 | 0.5 | 0.65 |
| **Umerkot** | 14.80 | 3297 | 0.5 | 24.40 |
| **Sanghar** | 4.70 | 2511 | 0.5 | 5.90 |
| **Shaheed Benazir Abad** | 0.05 | 4000 | 0.5 | 0.10 |
| **Hyderabad** | 0.06 | 2252 | 0.5 | 0.1 |
| **Dadu** | 0.26 | 2659 | 0.5 | 0.4 |
| **Matiari** | 0.13 | 2417 | 0.5 | 0.2 |
| **Khairpur** | 0.01 | 2500 | 0.5 | 0.0 |
| **Jamshoro** | 0.25 | 2600 | 0.5 | 0.3 |
| **Naushahro Feroze** | 0.01 | 2450 | 0.5 | 0.0 |
| **Tharparkar** | 0.05 | 2560 | 0.5 | 0.1 |
| **Jacobabad** | 0.00 | 0 | 0 | 0.0 |
| **Total** | 57.73 | 2721 | 0.5 | 78.5 |

## Onion Crop

The onions are mainly sown in Balochistan, Sindh, the Punjab and KP. The share of provinces in onion production is Baluchistan 38 %, Sindh 33%, Punjab 17% and KP 12%. Onions in Sindh and Balochistan are sown in autumn season. The production of this crop in these two provinces has picked up significantly because of frost free season at the time of growth and cool temperatures and low relative humidity at the time of harvest.

Onion Seed Crop

The onions from Baluchistan are available during August-October and from Sindh during November-April. The cropping season in punjab is during May-July and KP during June-August. The climatic factors are highly unpleasant in KP for harvesting, storage and marketing on account of scorching heat and a very high relative humidity that is damaging for the commodity. The estimated damage is as follows:

Onion in storage

### Damage to Onion Crop

| District | Area | Yield | Factor | Production |
|---|---|---|---|---|
| | 000 ha | kg/ha | Damage | 000 tons |
| Tando Muhammad Khan | 1.40 | 10714 | 0.9 | 13.5 |
| Badin | 0.20 | 9500 | 0.9 | 1.7 |
| Thatta | 2.20 | 10818 | 0.9 | 21.4 |
| Mirpurkhas | 5.40 | 11667 | 0.9 | 56.7 |
| Tando Allah Yar | 3.10 | 13871 | 0.9 | 38.7 |
| Umerkot | 2.50 | 11640 | 0.9 | 26.2 |
| Sanghar | 7.00 | 13586 | 0.9 | 85.6 |
| Shaheed Benazir Abad | 6.80 | 14603 | 0.9 | 89.4 |
| Hyderabad | 0.06 | 14664 | 0.9 | 0.8 |
| Dadu | 0.58 | 13348 | 0.9 | 6.9 |
| Matiari | 0.43 | 14839 | 0.9 | 5.7 |
| Khairpur | 0.11 | 14332 | 0.9 | 1.4 |
| Jamshoro | 0.24 | 12850 | 0.9 | 2.8 |
| Naushahro Feroze | 0.39 | 13937 | 0.9 | 5.0 |
| Tharparkar | 0.01 | 9885 | 0.9 | 0.1 |
| Jacobabad | 0.05 | 13722 | 0.9 | 0.6 |
| Total | 30.42 | 13020 | 0.9 | 356.4 |

## Tomato Crop

Tomatoes are grown all over Pakistan in all growing seasons. The area under tomato was 53.4 thousand ha and production was 561.89 thousand tons during the years 2009-10. The share of provinces in tomato production is Baluchistan 40%, KP 29%, Sindh 18% and Punjab 13%.

Tomato from Baluchistan start to become available at nearly the end of monsoon during August - October. The supplies during November - March mainly come from Sindh although some crop also comes from sub mountainous region of Dargai, Malakand in KP and Katha Saghral in Khushab, Punjab. Given the level of damage, the consumer prices are likely to be very high in coming months. The damage estimated is 70 thousand tons. The concept of a total crop in perishable commodities is pointless as these commodities have to be available afresh on daily basis. The statistics of the damages are as follows:

Tomato field

Tomato grading

### Damage to Tomato Crop

| District | Area | Yield | Factor | Production |
|---|---|---|---|---|
| | 000 ha | kg/ha | Damage | 000 tons |
| **Tando Muhammad Khan** | 0.19 | 8737 | 0.9 | 1.49 |
| **Badin** | 3.29 | 8982 | 0.9 | 26.60 |
| **Thatta** | 4.37 | 9087 | 0.9 | 35.74 |
| **Mirpurkhas** | 0.28 | 7179 | 0.9 | 1.81 |

| | | | | |
|---|---|---|---|---|
| **Tando Allah Yar** | 0.14 | 7714 | 0.9 | 0.97 |
| **Umerkot** | 0.18 | 7111 | 0.9 | 1.15 |
| **Sanghar** | 0.33 | 5879 | 0.9 | 1.75 |
| **Shaheed Benazir Abad** | 0.16 | 7063 | 0.9 | 1.02 |
| **Hyderabad** | 0.01 | 7413 | 0.9 | 0.09 |
| **Dadu** | 0.06 | 7956 | 0.9 | 0.40 |
| **Matiari** | 0.04 | 8170 | 0.9 | 0.30 |
| **Khairpur** | 0.00 | 6950 | 0.9 | 0.03 |
| **Jamshoro** | 0.02 | 9042 | 0.9 | 0.13 |
| **Naushahro Feroze** | 0.03 | 7936 | 0.9 | 0.21 |
| **Tharparkar** | 0.00 | 8050 | 0.9 | 0.00 |
| **Jacobabad** | 0.00 | 0 | 0.9 | 0.00 |
| **Total** | 9.10 | 8050 | 0.9 | 70.52 |

### Rice Crop

Rice is an important component of food basket in the world including Pakistan. The aromatic basmati rice of Pakistan is a ceremonial dish in Pakistan and an important source of foreign exchange earnings. Coarse /IRRI rice is generally grown in southern parts of the Indus plain including southern Punjab and right bank of Indus in Sindh. The induction of high hybrid seeds from China has resulted in increase in the total production recent years.


**Standing water in rice field at Badin**

## Damage to Rice Crop

| District | Sindh | | | |
|---|---|---|---|---|
| | 000 ha | Kg/ha | Damage factor | 000 tons |
| Tando Muhammad Khan | 4.5 | 3349 | 1 | 15.07 |
| Badin | 55.1 | 3081 | 1 | 169.76 |
| Thatta | 18 | 2989 | 1 | 53.80 |
| Mirpurkhas | 0.3 | 2675 | 1 | 0.80 |
| Tando Allah Yar | 0 | 0 | 1 | 0.00 |
| Umerkot | 0 | 0 | 1 | 0.00 |
| Sanghar | 3.6 | 3005 | 1 | 10.82 |
| Nawabshah | 0.8 | 3188 | 1 | 2.55 |
| Hyderabad | 0.05 | 2900 | 1 | 0.13 |
| Dadu | 3.26 | 3719 | 1 | 12.14 |
| Matiari | 0.02 | 2643 | 1 | 0.05 |
| Khairpur | 0.10 | 3047 | 1 | 0.29 |
| Jamshoro | 0.00 | 3600 | 1 | 0.01 |
| Naushahro Feroze | 0.15 | 2896 | 1 | 0.43 |
| Tharparkar | 0.00 | 0 | 1 | 0.00 |
| Jacobabad | 1.68 | 3000 | 1 | 5.04 |
| Total | 87.56 | 3094 | 1 | 270.9 |
| Punjab | | | | |
| Kasur | 1.34 | 1993.00 | 1.00 | 2.68 |
| Bahawalnagar | 0.72 | 1799.00 | 1.00 | 1.30 |
| Vehari | 0.23 | 1849.00 | 1.00 | 0.43 |
| Total | 2.3 | 1917.0 | 1.0 | 4.4 |
| Balochistan | | | | |
| Nasirabad | 0.68 | 3409.00 | 1.00 | 2.31 |
| Jaffarabad | 2.04 | 3391.00 | 1.00 | 6.91 |
| Jhal Magsi | 0.00 | 0.00 | 1.00 | 0.00 |
| Total | 2.71 | 3395 | 1.00 | 9.2 |

The wide spread monsoon rains have benefitted the crop. except in the downstream district of Badin where breach in LBOD caused damage to crops.

## Sugarcane Crop

Sugarcane is a long gestation, hydrophilic, high input and management demanding, tropical crop. It has two sowing seasons i.e. autumn in Sindh and spring in the Punjab and KP. There was some localized, diminutive damage to crop by flood water. In general a bumper crop is expected.

**Submerged sugarcane field at Tando Allah Yar**

The crushing of sugarcane usually starts during mid November and continues to the end of February. There may be some exceptions.

The Sindh Sugar Factory Control Ordinance 1950 decrees that sugar mills are to be operational on October 1, 2011. Sindh Government should assure its implementation. A long term submergence of crop can cause lodging and would be determental to crop.

## Maize Crop

Maize is an important feed crop of Pakistan. Two crops are grown in the country viz. spring and autumn. The spring crop is mainly confined to central Punjab. It is sown by hybrid seeds that are demanding in investment, farm management and inputs. This crop is therefore confined to irrigated areas.

The autumn crop is mainly grown both in irrigated and barani areas. This crop is generally sown by synthetic seeds. The productivity of spring crop is more than 8 tons per ha on an average and the productivity of autumn crop is about 2 tons per ha. The crop at this stage is in good condition and free of any damage.

## 4. Damage to Infrastructure

Beside damage to standing crops, 9824 settlements comprising 0.92 million houses, 11583 Km national and provincial roads (Kachha, Pakka Roads) and 191 Km of railway tracks have been damaged in Sindh, Punjab and Baluchistan. Several breaches / overflow in protective bunds of canals added to inundation in districts Badin, Mirpurkhas, UmerKot and Tando Muhammad Khan in Sindh. Summary of damage is given in the following pages.


**Damaged Housing**


**Displaced People**


**Damaged Roads**

## Summary of damage to Infrastructure and Agriculture

| FLOOD / RAIN 2011 DAMAGES SUMMARY | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| District | Inundated Area (Sq km) | Damaged Roads (Km) | | | Railway (Km) | Bridge | No. of Settlements | Agriculture (Sq km) | No. of Houses |
| | | National | Provincial | Kacha Pakka | | | | | |
| Badin | 3751 | 23 | 1708 | 2412 | 13.3 | 5 | 1277 | 3031 | 163908 |
| Bahawalnagar | 81 | 0 | 0 | 154 | 0 | | 197 | 54 | 6530 |
| Benazirabad | 850 | 25 | 434.6 | 527.6 | 38.9 | | 465 | 640 | 81551 |
| Dadu | 360 | 0 | 136 | 388 | 3.1 | 1 | 232 | 186 | 36578 |
| Hyderabad | 151 | 0 | 14.9 | 169 | 10.7 | | 138 | 66 | 16581 |
| Jacobabad | 517 | 0 | 17 | 817 | 17 | | 345 | 169 | 24827 |
| Jafferabad | 211 | 0 | 76 | 258 | 0 | | 56 | 152 | 4970 |
| Jamshoro | 154 | 0 | 55 | 101 | 0 | | 85 | 69 | 11019 |
| Jhal Magsi | 146 | 0 | 31 | 171 | 0 | | 118 | 14 | 5426 |
| Kasur | 138 | 0 | 0 | 154.5 | 0 | | 99 | 40.7 | 7139 |
| Khairpur | 268 | 0 | 37 | 545 | 0 | | 372 | 187 | 37471 |
| Matiari | 325 | 0 | 58 | 147 | 10.3 | | 227 | 193.2 | 33527 |
| Mirpurkhas | 1694 | 33 | 1559 | 1764 | 45 | | 987 | 1303 | 200861 |
| Nasirabad | 79 | 0 | 7 | 64 | 0 | | 51 | 71 | 4945 |
| Naushahro Ferzoe | 376 | 8 | 188 | 223 | 23 | | 649 | 237 | 50225 |
| Sanghar | 2554 | 28 | 773 | 1493 | 9 | 7 | 1052 | 1674 | 57823 |
| Tando Allah Yar | 462 | 0 | 106 | 290 | 0 | | 286 | 334 | 53143 |
| Tharparkar | 197 | 0 | 39 | 234 | 0 | | 233 | 47.9 | 14179 |
| Thatta | 621 | 0 | 133 | 373 | 0 | | 627 | 176 | 22621 |
| TM Khan | 346 | 3 | 243 | 578 | 1.8 | | 708 | 271 | 32636 |
| Umerkot | 754 | 2.5 | 127 | 634 | 19.5 | | 1543 | 651 | 55379 |
| Vehari | 56 | 0 | 0 | 86 | 0 | | 77 | 36.7 | 2415 |
| **Total** | **14091** | **122.5** | **5742.5** | **11583.1** | **191.6** | **12** | **9824** | **9603.5** | **923754** |

## 5. Recession of Flood Water

The information on recession of water in the inundated areas is very important for planning relief and early recovery operations. This information is also very helpful in identifying damage to crops in inundated areas and preparing for the following crop sowing season. Cognizant of this situation, SUPARCO prepared district wise recession statistics on 5-daily basis, using 250 m resolution satellite data. This inundation duration information was further substantiated through use of high resolution SPOT satellites, with resolution ranging from 2.5 m to 20 m. It is to be noted that in Sindh, 204 thousand ha area is still inundated on December 31,20 2011.

Damage to Infrastructure


Flooded Area

Damaged Cotton Crop

Damaged Rice Crop


Damaged Rice Crop

Damaged Sugarcane Crop

| Inundation Duration Statistics Area (Sq Km) | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| District | Inundated Area | 20-Sep | 28-Sep | 1-Oct | 3-Oct | 8-Oct | 13-Oct | 18-Oct | 25-Oct | 30-Oct | 4-Nov | 11-Nov | 16-Nov | 21-Nov | 27-Nov | 11-Dec | 25-Dec | 31-Dec |
| Badin | 3751 | ↑ 3751 | ↓ 3687 | ↓ 3644 | ↓ 3632 | ↓ 2645 | ↓ 2359 | ↓ 1930 | ↓ 1767 | ↓ 1592 | ↓ 1425 | ↓ 1401 | ↓ 1208 | ↓ 1145 | ↓ 968 | ↓ 783 | ↓ 573 | ↓ 483 |
| Bahawalnager | 81 | *NR | ↑ 81 | ↓ 70 | ↓ 62 | ↓ 38 | ↓ 23 | ↓ 14 | ↓ 11 | ↓ 5 | ↓ 1 | ↓ 1 | ↓ 1 | ↓ 1 | ↓ 1 | ↓ 0 | ↓ 0 | ↓ 0 |
| Benazirabad | 850 | ↑ 850 | ↓ 827 | ↓ 806 | ↓ 797 | ↓ 417 | ↓ 288 | ↓ 256 | ↓ 232 | ↓ 163 | ↓ 150 | ↓ 142 | ↓ 128 | ↓ 123 | ↓ 118 | ↓ 97 | ↓ 82 | ↓ 81 |
| Dadu | 360 | NR | ↑ 360 | ↓ 289 | ↓ 279 | ↓ 186 | ↓ 175 | ↓ 140 | ↓ 107 | ↓ 98 | ↓ 87 | ↓ 86 | ↓ 75 | ↓ 71 | ↓ 65 | ↓ 60 | ↓ 55 | ↓ 53 |
| Hyderabad | 151 | NR | ↑ 151 | ↓ 137 | ↓ 137 | ↓ 34 | ↓ 22 | ↓ 22 | ↓ 22 | ↓ 20 | ↓ 19 | ↓ 18 | ↓ 14 | ↓ 13 | ↓ 13 | ↓ 12 | ↓ 8 | ↓ 7 |
| Jacobabad | 517 | NR | ↑ 517 | ↓ 492 | ↓ 490 | ↓ 235 | ↓ 169 | ↓ 114 | ↓ 103 | ↓ 95 | ↓ 77 | ↓ 74 | ↓ 63 | ↓ 59 | ↓ 55 | ↓ 39 | ↓ 30 | ↓ 28 |
| Jafarabad | 211 | NR | ↑ 211 | ↓ 190 | ↓ 185 | ↓ 124 | ↓ 80 | ↓ 64 | ↓ 41 | ↓ 19 | ↓ 13 | ↓ 11 | ↓ 8 | ↓ 6 | ↓ 5 | ↓ 1 | ↓ 0 | ↓ 0 |
| Jamshoro | 154 | NR | ↑ 154 | ↓ 110 | ↓ 101 | ↓ 68 | ↓ 54 | ↓ 33 | ↓ 29 | ↓ 21 | ↓ 20 | ↓ 20 | ↓ 18 | ↓ 17 | ↓ 16 | ↓ 15 | ↓ 10 | ↓ 8 |
| Jhal Magsi | 146 | NR | ↑ 146 | ↓ 135 | ↓ 130 | ↓ 88 | ↓ 59 | ↓ 47 | ↓ 31 | ↓ 13 | ↓ 9 | ↓ 7 | ↓ 4 | ↓ 3 | ↓ 3 | ↓ 2 | ↓ 0 | ↓ 0 |
| Kasur | 138 | NR | ↑ 138 | ↓ 133 | ↓ 122 | ↓ 55 | ↓ 42 | ↓ 29 | ↓ 17 | ↓ 6 | ↓ 4 | ↓ 3 | ↓ 1 | ↓ 1 | ↓ 1 | ↓ 0 | ↓ 0 | ↓ 0 |
| Khairpur | 268 | NR | ↑ 268 | ↓ 260 | ↓ 258 | ↓ 29 | ↓ 18 | ↓ 17 | ↓ 16 | ↓ 14 | ↓ 13 | ↓ 12 | ↓ 9 | ↓ 8 | ↓ 7 | ↓ 6 | ↓ 4 | ↓ 3 |
| Matiari | 325 | NR | ↑ 325 | ↓ 315 | ↓ 314 | ↓ 116 | ↓ 79 | ↓ 75 | ↓ 71 | ↓ 57 | ↓ 45 | ↓ 44 | ↓ 40 | ↓ 35 | ↓ 32 | ↓ 30 | ↓ 22 | ↓ 20 |
| Mirpurkhas | 1694 | ↑ 1694 | ↓ 1685 | ↓ 1674 | ↓ 1668 | ↓ 1288 | ↓ 1079 | ↓ 867 | ↓ 785 | ↓ 670 | ↓ 641 | ↓ 602 | ↓ 520 | ↓ 460 | ↓ 397 | ↓ 278 | ↓ 209 | ↓ 200 |
| Nasirabad | 79 | NR | ↑ 79 | ↓ 75 | ↓ 68 | ↓ 41 | ↓ 28 | ↓ 21 | ↓ 15 | ↓ 8 | ↓ 5 | ↓ 4 | ↓ 2 | ↓ 1 | ↓ 1 | ↓ 0 | ↓ 0 | ↓ 0 |
| Naushahro Feroze | 376 | NR | ↑ 376 | ↓ 365 | ↓ 362 | ↓ 110 | ↓ 69 | ↓ 50 | ↓ 47 | ↓ 37 | ↓ 31 | ↓ 30 | ↓ 27 | ↓ 26 | ↓ 25 | ↓ 24 | ↓ 20 | ↓ 19 |
| Sanghar | 2554 | ↑ 2554 | ↓ 2550 | ↓ 2450 | ↓ 2442 | ↓ 2081 | ↓ 1726 | ↓ 1543 | ↓ 1458 | ↓ 1254 | ↓ 1223 | ↓ 1170 | ↓ 1076 | ↓ 987 | ↓ 925 | ↓ 771 | ↓ 672 | ↓ 648 |
| Tando Allah Yar | 462 | ↑ 462 | ↓ 450 | ↓ 448 | ↓ 446 | ↓ 264 | ↓ 234 | ↓ 223 | ↓ 219 | ↓ 201 | ↓ 198 | ↓ 196 | ↓ 178 | ↓ 167 | ↓ 165 | ↓ 141 | ↓ 112 | ↓ 108 |
| Tharparkar | 197 | NR | ↑ 197 | ↑ 202 | ↓ 201 | ↓ 126 | ↑ 178 | ↓ 157 | ↓ 145 | ↓ 120 | ↓ 109 | ↓ 105 | ↓ 97 | ↓ 85 | ↓ 79 | ↓ 60 | ↓ 23 | ↓ 19 |
| Thatta | 621 | ↑ 621 | ↑ 650 | ↓ 606 | ↓ 606 | ↓ 393 | ↓ 275 | ↓ 214 | ↓ 206 | ↓ 136 | ↓ 120 | ↓ 115 | ↓ 102 | ↓ 84 | ↓ 78 | ↓ 65 | ↓ 45 | ↓ 43 |
| TM Khan | 346 | ↑ 346 | ↓ 340 | ↓ 336 | ↓ 333 | ↓ 179 | ↓ 131 | ↓ 96 | ↓ 84 | ↓ 81 | ↓ 75 | ↓ 68 | ↓ 61 | ↓ 58 | ↓ 57 | ↓ 55 | ↓ 34 | ↓ 27 |
| Umer Kot | 754 | ↑ 754 | ↑ 760 | ↑ 784 | ↓ 784 | ↓ 674 | ↓ 637 | ↓ 566 | ↓ 561 | ↓ 491 | ↓ 468 | ↓ 455 | ↓ 430 | ↓ 421 | ↓ 415 | ↓ 347 | ↓ 297 | ↓ 294 |
| Vehari | 56 | NR | ↑ 56 | ↓ 49 | ↓ 44 | ↓ 23 | ↓ 14 | ↓ 8 | ↓ 4 | ↓ 3 | ↓ 1 | ↓ 1 | ↓ 0 | ↓ 0 | ↓ 0 | ↓ 0 | ↓ 0 | ↓ 0 |
| **Total** | **14091** | **11032** | **14008** | ↓ **13570** | ↓ **13461** | ↓ **9214** | ↓ **7739** | ↓ **6486** | ↓ **5971** | ↓ **5104** | ↓ **4734** | ↓ **4565** | ↓ **4062** | ↓ **3771** | ↓ **3426** | ↓ **2786** | ↓ **2196** | ↓ **2041** |

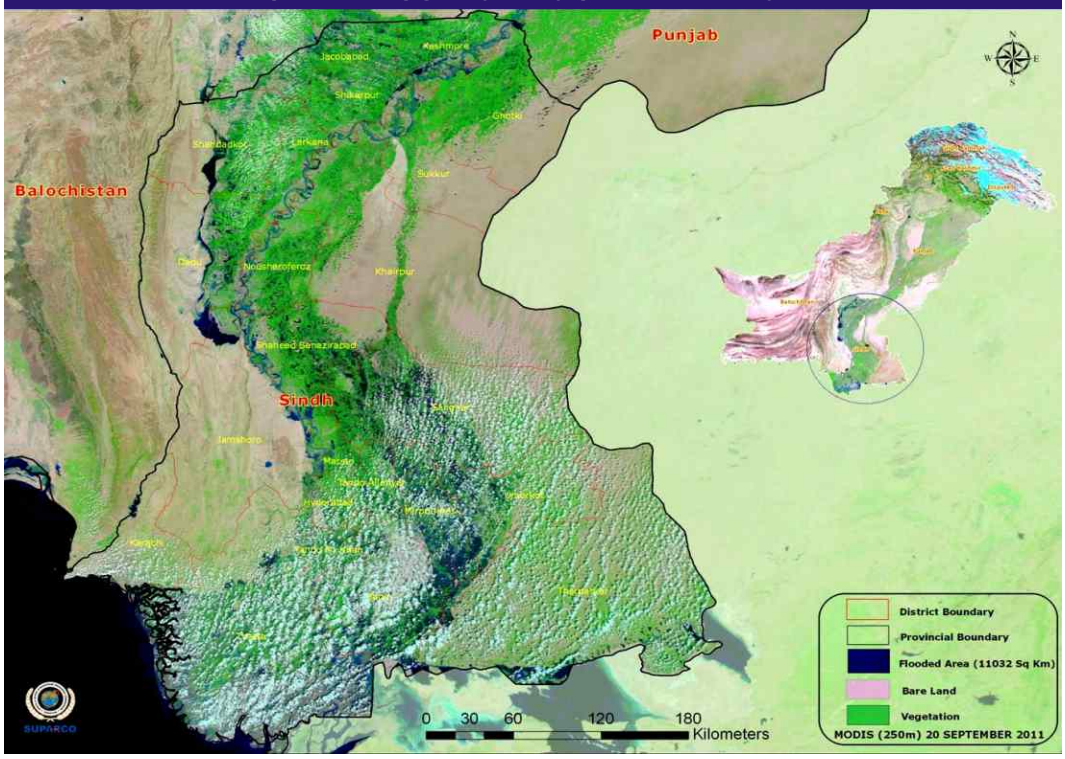
NR = Not Reported  Increase ↑  Decrease ↓

| Inundation Duration Statistics Area (Ha) | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| District | Inundated Area | 20-Sep | 28-Sep | 1-Oct | 3-Oct | 8-Oct | 13-Oct | 18-Oct | 25-Oct | 30-Oct | 4-Nov | 11-Nov | 16-Nov | 21-Nov | 27-Nov | 11-Dec | 25-Dec | 31-Dec |
| Badin | 375100 | ↑ 375100 | ↓ 368700 | ↓ 364400 | ↓ 363200 | ↓ 264500 | ↓ 235900 | ↓ 193000 | ↓ 176700 | ↓ 159200 | ↓ 142500 | ↓ 140100 | ↓ 120800 | ↓ 114500 | ↓ 96800 | ↓ 78300 | ↓ 57300 | ↓ 48300 |
| Bahawalnager | 8100 | *NR | ↑ 8100 | ↓ 7000 | ↓ 6200 | ↓ 3800 | ↓ 2300 | ↓ 1400 | ↓ 1100 | ↓ 500 | ↓ 100 | ↓ 100 | ↓ 100 | ↓ 100 | ↓ 100 | ↓ 0 | ↓ 0 | ↓ 0 |
| Benazirabad | 85000 | ↑ 85000 | ↓ 82700 | ↓ 80600 | ↓ 79700 | ↓ 41700 | ↓ 28800 | ↓ 25600 | ↓ 23200 | ↓ 16300 | ↓ 15000 | ↓ 14200 | ↓ 12800 | ↓ 12300 | ↓ 11800 | ↓ 9700 | ↓ 8200 | ↓ 8100 |
| Dadu | 36000 | NR | ↑ 36000 | ↓ 28900 | ↓ 27900 | ↓ 18600 | ↓ 17500 | ↓ 14000 | ↓ 10700 | ↓ 9800 | ↓ 8700 | ↓ 8600 | ↓ 7500 | ↓ 7100 | ↓ 6500 | ↓ 6000 | ↓ 5500 | ↓ 5300 |
| Hyderabad | 15100 | NR | ↑ 15100 | ↓ 13700 | ↓ 13700 | ↓ 3400 | ↓ 2200 | ↓ 2200 | ↓ 2200 | ↓ 2000 | ↓ 1900 | ↓ 1800 | ↓ 1400 | ↓ 1300 | ↓ 1300 | ↓ 1200 | ↓ 800 | ↓ 700 |
| Jacobabad | 51700 | NR | ↑ 51700 | ↓ 49200 | ↓ 49000 | ↓ 23500 | ↓ 16900 | ↓ 11400 | ↓ 10300 | ↓ 9500 | ↓ 7700 | ↓ 7400 | ↓ 6300 | ↓ 5900 | ↓ 5500 | ↓ 3900 | ↓ 3000 | ↓ 2800 |
| Jafarabad | 21100 | NR | ↑ 21100 | ↓ 19000 | ↓ 18500 | ↓ 12400 | ↓ 8000 | ↓ 6400 | ↓ 4100 | ↓ 1900 | ↓ 1300 | ↓ 1100 | ↓ 800 | ↓ 600 | ↓ 500 | ↓ 100 | ↓ 0 | ↓ 0 |
| Jamshoro | 15400 | NR | ↑ 15400 | ↓ 11000 | ↓ 10100 | ↓ 6800 | ↓ 5400 | ↓ 3300 | ↓ 2900 | ↓ 2100 | ↓ 2000 | ↓ 2000 | ↓ 1800 | ↓ 1700 | ↓ 1600 | ↓ 1500 | ↓ 1000 | ↓ 800 |
| Jhal Magsi | 14600 | NR | ↑ 14600 | ↓ 13500 | ↓ 13000 | ↓ 8800 | ↓ 5900 | ↓ 4700 | ↓ 3100 | ↓ 1300 | ↓ 900 | ↓ 700 | ↓ 400 | ↓ 300 | ↓ 300 | ↓ 200 | ↓ 0 | ↓ 0 |
| Kasur | 13800 | NR | ↑ 13800 | ↓ 13300 | ↓ 12200 | ↓ 5500 | ↓ 4200 | ↓ 2900 | ↓ 1700 | ↓ 600 | ↓ 400 | ↓ 300 | ↓ 100 | ↓ 100 | ↓ 100 | ↓ 0 | ↓ 0 | ↓ 0 |
| Khairpur | 26800 | NR | ↑ 26800 | ↓ 26000 | ↓ 25800 | ↓ 2900 | ↓ 1800 | ↓ 1700 | ↓ 1600 | ↓ 1400 | ↓ 1300 | ↓ 1200 | ↓ 900 | ↓ 800 | ↓ 700 | ↓ 600 | ↓ 400 | ↓ 300 |
| Matiari | 32500 | NR | ↑ 32500 | ↓ 31500 | ↓ 31400 | ↓ 11600 | ↓ 7900 | ↓ 7500 | ↓ 7100 | ↓ 5700 | ↓ 4500 | ↓ 4400 | ↓ 4000 | ↓ 3500 | ↓ 3200 | ↓ 3000 | ↓ 2200 | ↓ 2000 |
| Mirpurkhas | 169400 | ↑ 169400 | ↓ 168500 | ↓ 167400 | ↓ 166800 | ↓ 128800 | ↓ 107900 | ↓ 86700 | ↓ 78500 | ↓ 67000 | ↓ 64100 | ↓ 60200 | ↓ 52000 | ↓ 46000 | ↓ 39700 | ↓ 27800 | ↓ 20900 | ↓ 20000 |
| Nasirabad | 7900 | NR | ↑ 7900 | ↓ 7500 | ↓ 6800 | ↓ 4100 | ↓ 2800 | ↓ 2100 | ↓ 1500 | ↓ 800 | ↓ 500 | ↓ 400 | ↓ 200 | ↓ 100 | ↓ 100 | ↓ 0 | ↓ 0 | ↓ 0 |
| Naushahro Feroze | 37600 | NR | ↑ 37600 | ↓ 36500 | ↓ 36200 | ↓ 11000 | ↓ 6900 | ↓ 5000 | ↓ 4700 | ↓ 3700 | ↓ 3100 | ↓ 3000 | ↓ 2700 | ↓ 2600 | ↓ 2500 | ↓ 2400 | ↓ 2000 | ↓ 1900 |
| Sanghar | 255400 | ↑ 255400 | ↓ 255000 | ↓ 245000 | ↓ 244200 | ↓ 208100 | ↓ 172600 | ↓ 154300 | ↓ 145800 | ↓ 125400 | ↓ 122300 | ↓ 117000 | ↓ 107600 | ↓ 98700 | ↓ 92500 | ↓ 77100 | ↓ 67200 | ↓ 64800 |
| Tando Allah Yar | 46200 | ↑ 46200 | ↓ 45000 | ↓ 44800 | ↓ 44600 | ↓ 26400 | ↓ 23400 | ↓ 22300 | ↓ 21900 | ↓ 20100 | ↓ 19800 | ↓ 19600 | ↓ 17800 | ↓ 16700 | ↓ 16500 | ↓ 14100 | ↓ 11200 | ↓ 10800 |
| Tharparkar | 19700 | NR | ↑ 19700 | ↑ 20200 | ↓ 20100 | ↓ 12600 | ↑ 17800 | ↓ 15700 | ↓ 14500 | ↓ 12000 | ↓ 10900 | ↓ 10500 | ↓ 9700 | ↓ 8500 | ↓ 7900 | ↓ 6000 | ↓ 2300 | ↓ 1900 |
| Thatta | 62100 | ↑ 62100 | ↑ 65000 | ↓ 60600 | ↓ 60600 | ↓ 39300 | ↓ 27500 | ↓ 21400 | ↓ 20600 | ↓ 13600 | ↓ 12000 | ↓ 11500 | ↓ 10200 | ↓ 8400 | ↓ 7800 | ↓ 6500 | ↓ 4500 | ↓ 4300 |
| TM Khan | 34600 | ↑ 34600 | ↓ 34000 | ↓ 33600 | ↓ 33300 | ↓ 17900 | ↓ 13100 | ↓ 9600 | ↓ 8400 | ↓ 8100 | ↓ 7500 | ↓ 6800 | ↓ 6100 | ↓ 5800 | ↓ 5700 | ↓ 5500 | ↓ 3400 | ↓ 2700 |
| Umer Kot | 75400 | ↑ 75400 | ↑ 76000 | ↑ 78400 | ↓ 78400 | ↓ 67400 | ↓ 63700 | ↓ 56600 | ↓ 56100 | ↓ 49100 | ↓ 46800 | ↓ 45500 | ↓ 43000 | ↓ 42100 | ↓ 41500 | ↓ 34700 | ↓ 29700 | ↓ 29400 |
| Vehari | 5600 | NR | ↑ 5600 | ↓ 4900 | ↓ 4400 | ↓ 2300 | ↓ 1400 | ↓ 800 | ↓ 400 | ↓ 300 | ↓ 100 | ↓ 100 | ↓ 0 | ↓ 0 | ↓ 0 | ↓ 0 | ↓ 0 | ↓ 0 |
| Total | 1409100 | ↑ 1103200 | ↑ 1400800 | ↓ 1357000 | ↓ 1346100 | ↓ 921400 | ↓ 773900 | ↓ 648600 | ↓ 597100 | ↓ 510400 | ↓ 473400 | ↓ 456500 | ↓ 406200 | ↓ 377100 | ↓ 342600 | ↓ 278600 | ↓ 219600 | ↓ 204100 |

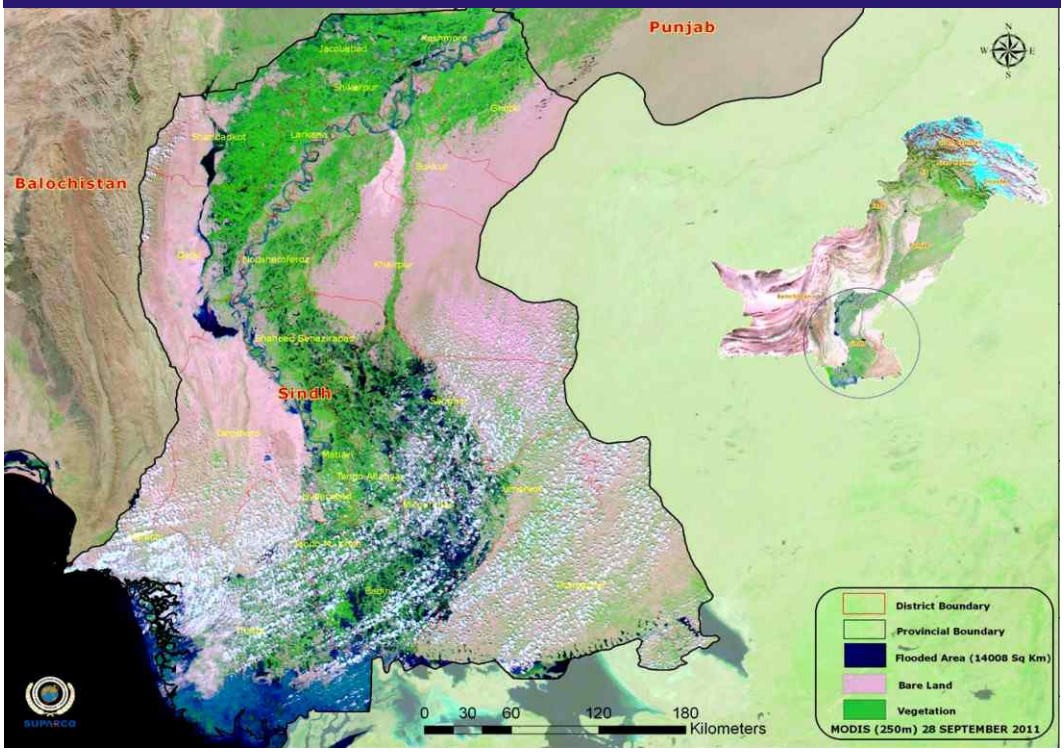
NR = Not Reported  Increase ↑  Decrease ↓

## Temporal images of flood water recession

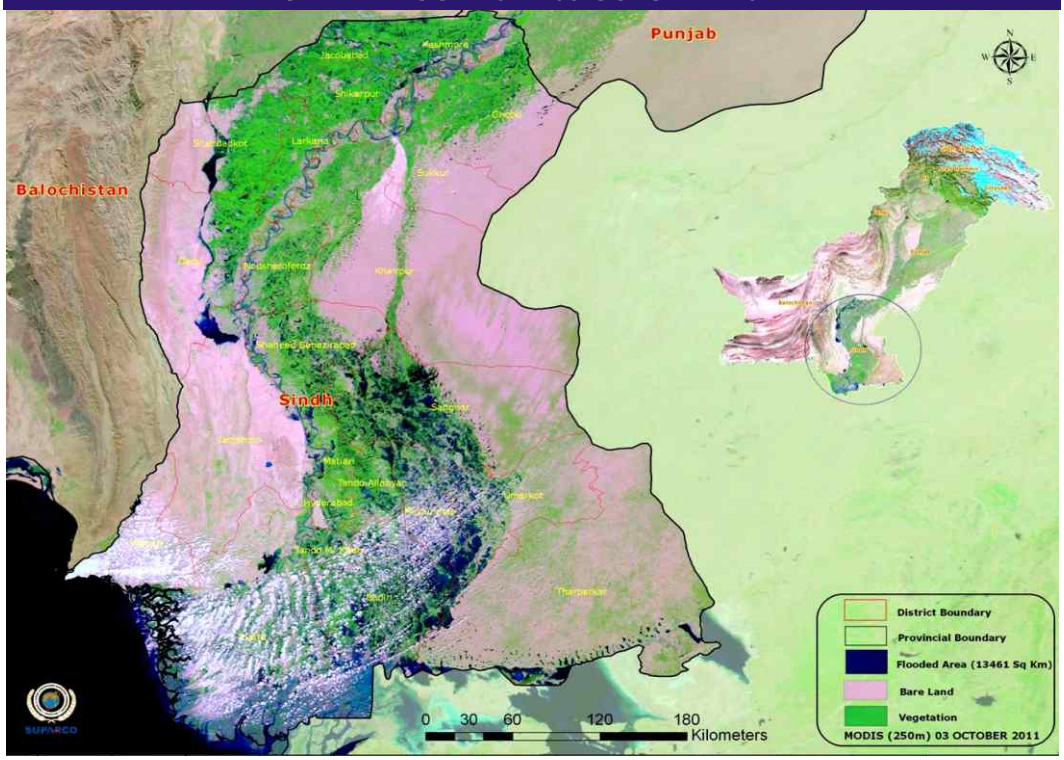
**SINDH: FLOOD 2011: 20-SEPTEMBER-2011**



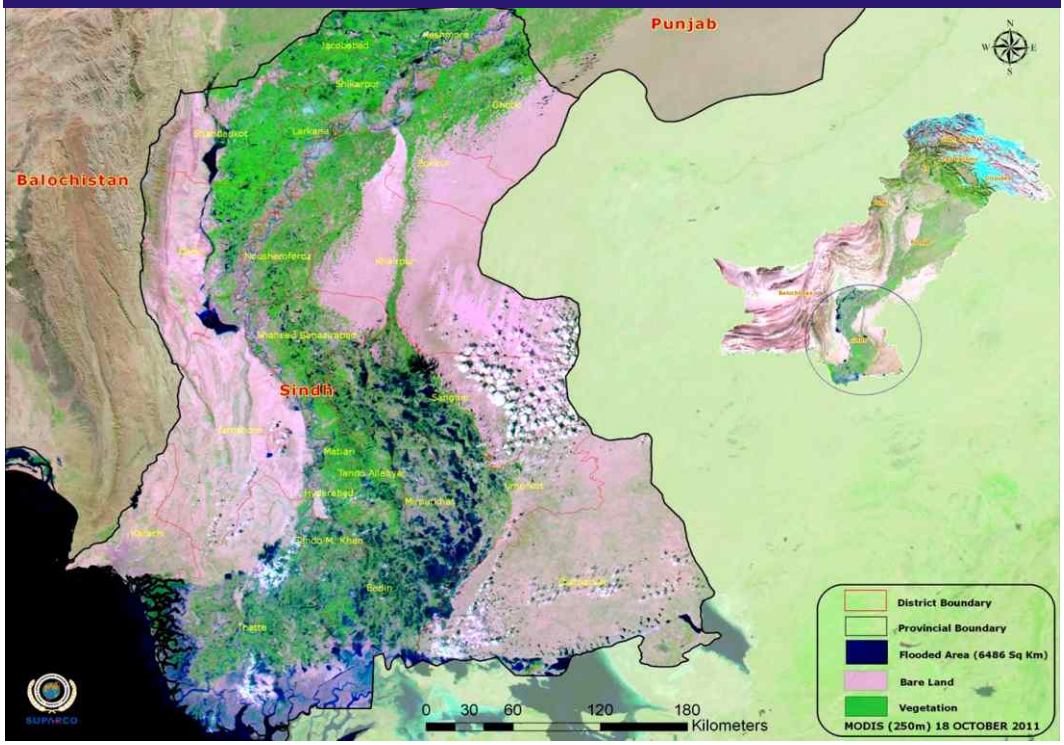

**SINDH: FLOOD 2011: 28-SEPTEMBER-2011**



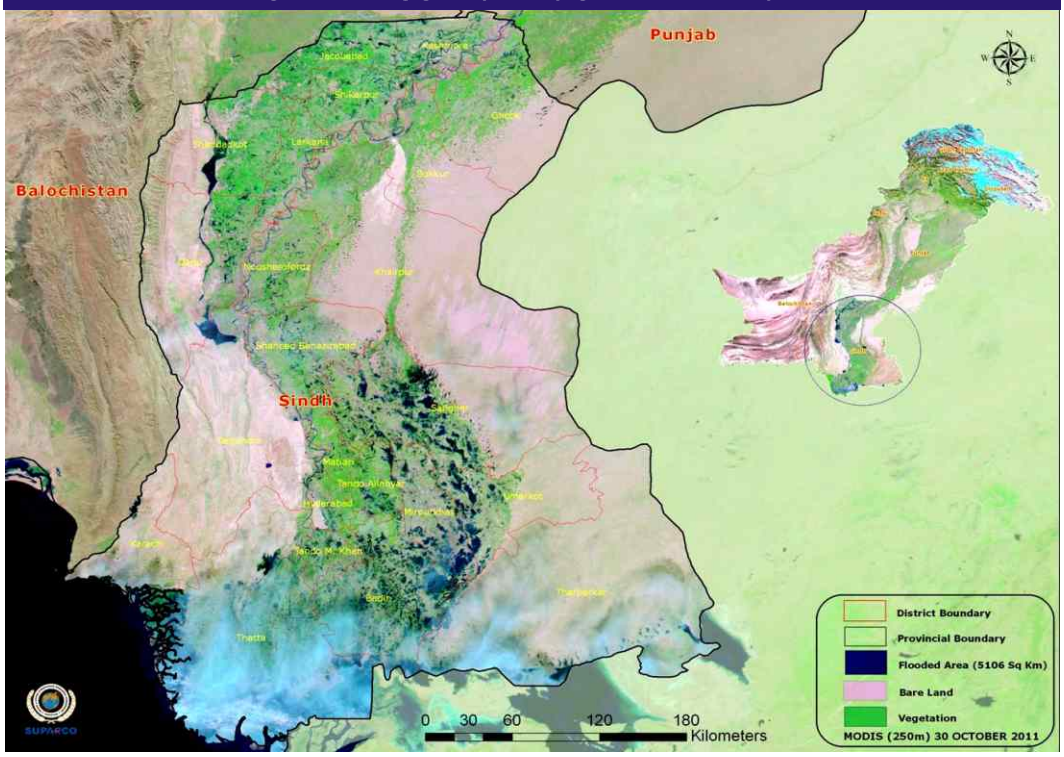
## SINDH: FLOOD 2011: 03-OCTOBER-2011



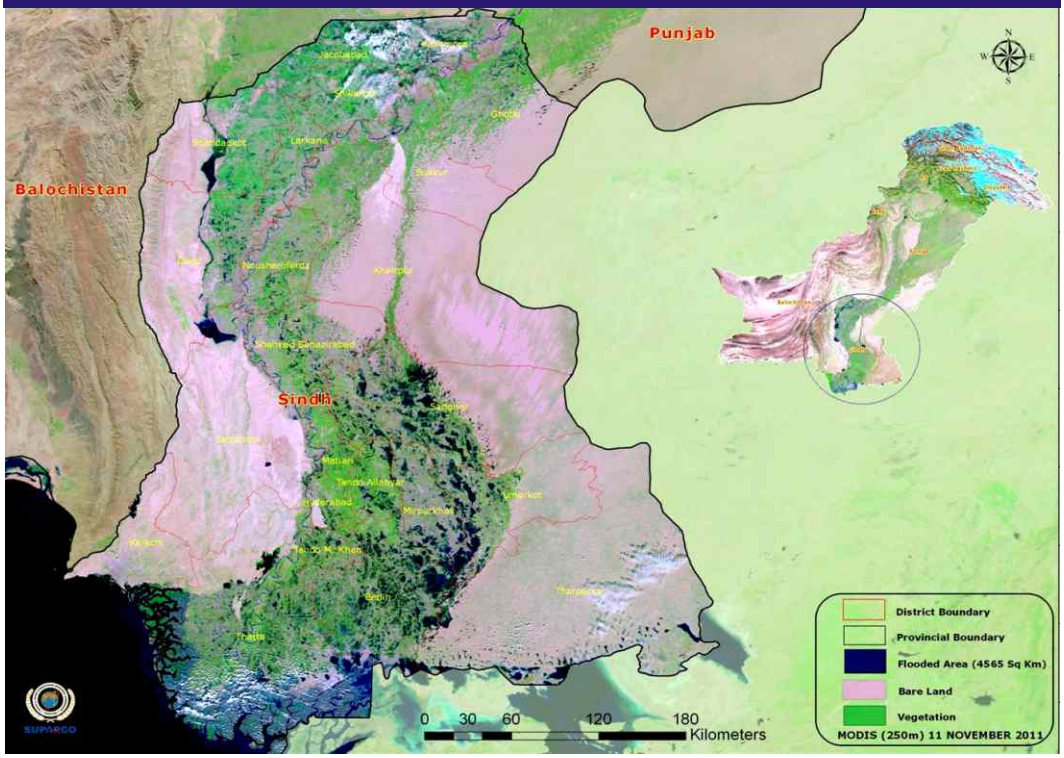

## SINDH: FLOOD 2011: 81-OCTOBER-2011



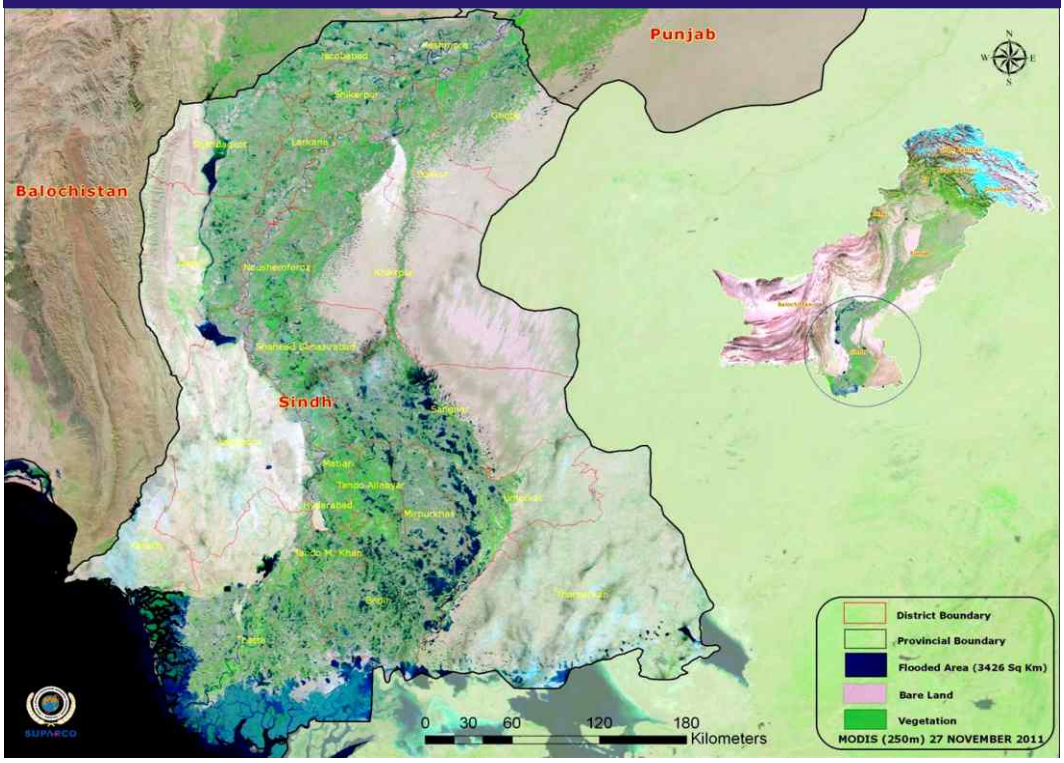
## SINDH: FLOOD 2011: 20-SEPTEMBER-2011



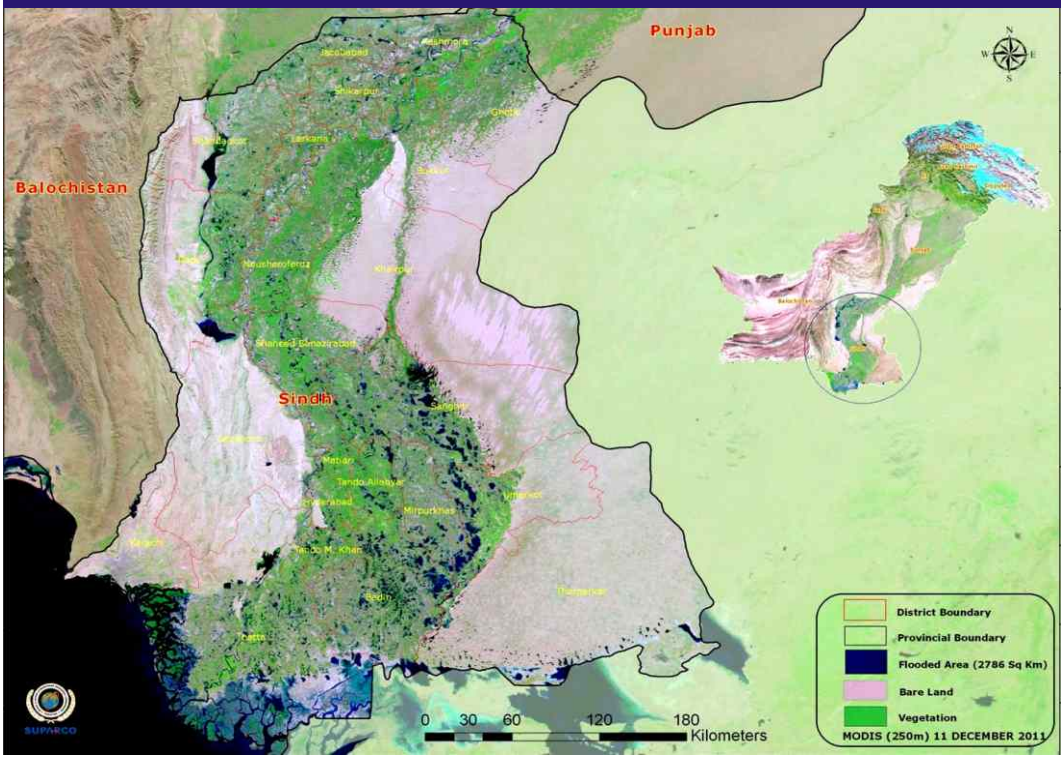

## SINDH: FLOOD 2011: 28-SEPTEMBER-2011



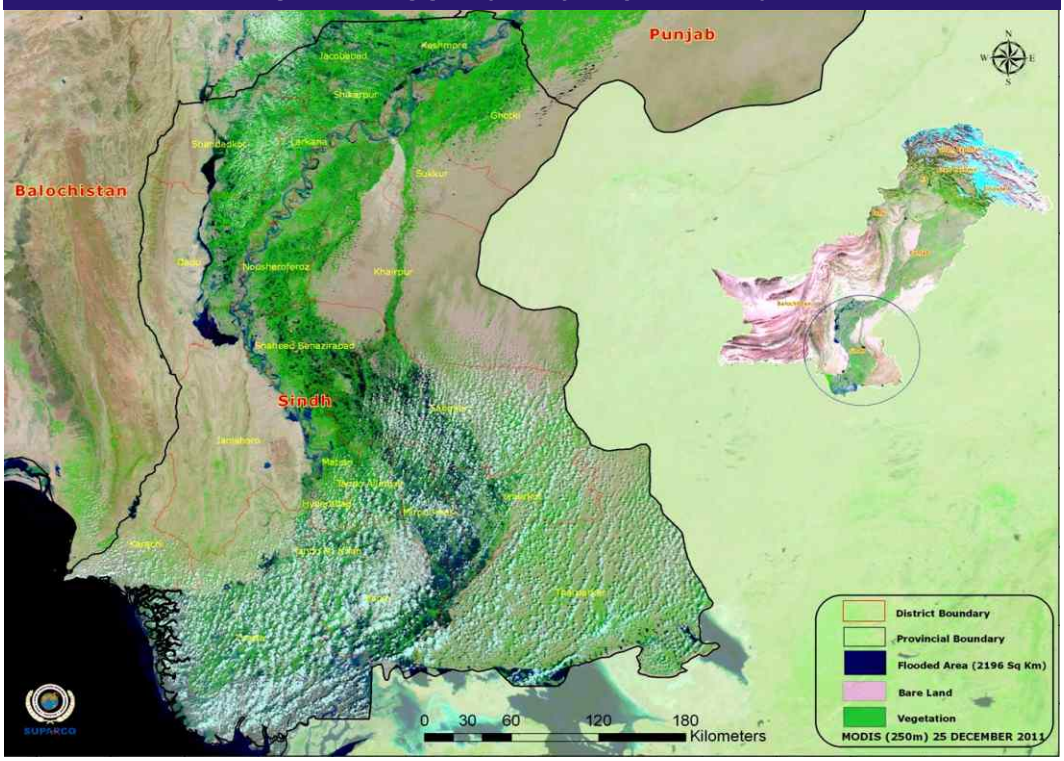
## SINDH: FLOOD 2011: 27-NOVEMBER-2011



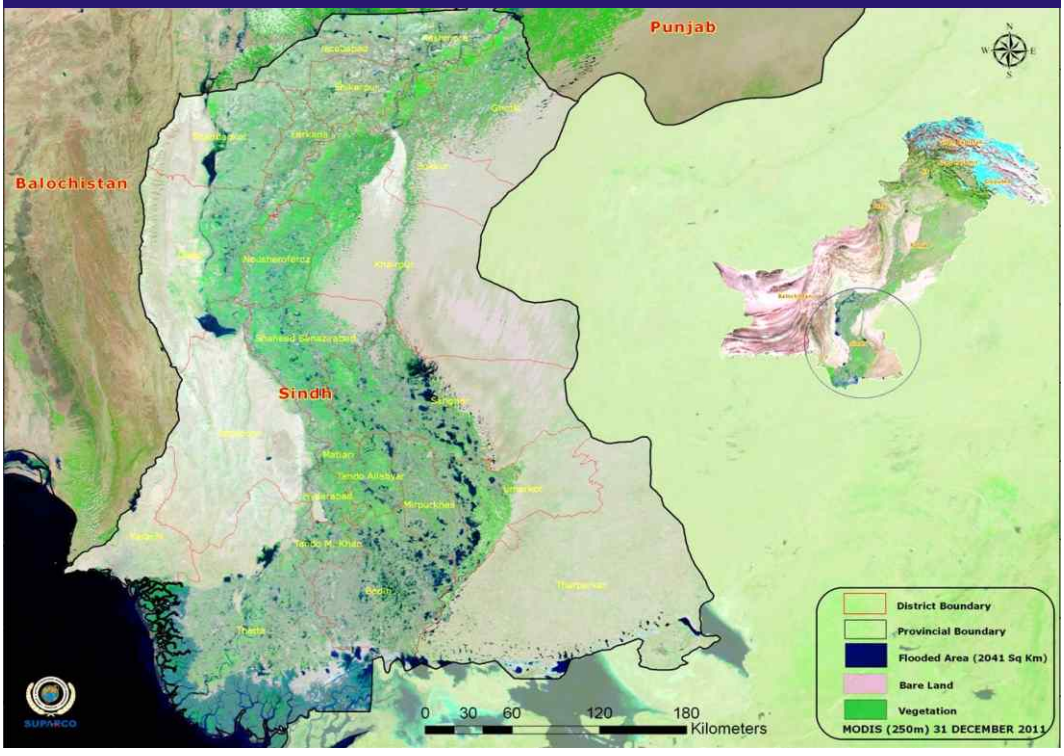

## SINDH: FLOOD 2011: 11-DECEMBER-2011



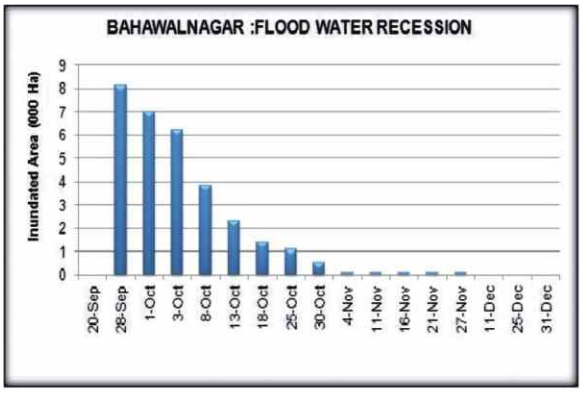
## SINDH: FLOOD 2011: 25-DECEMBER-2011

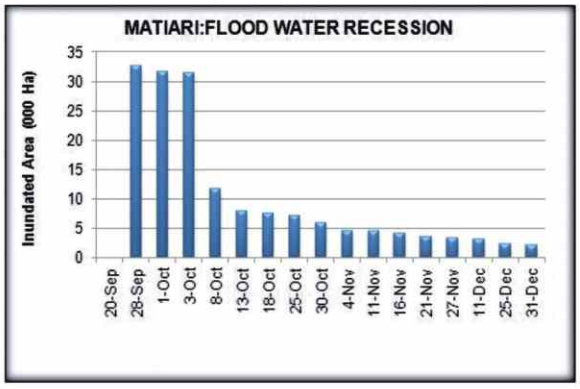


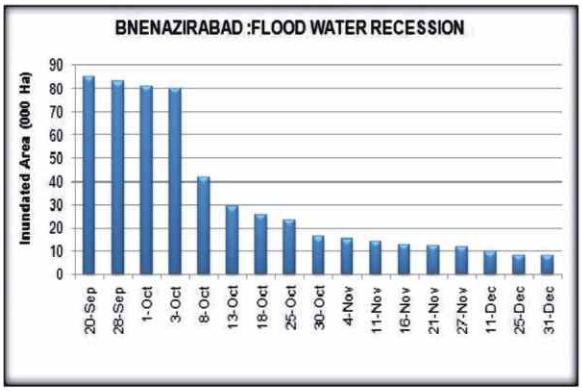

## SINDH: FLOOD 2011: 31-DECEMBER-2011

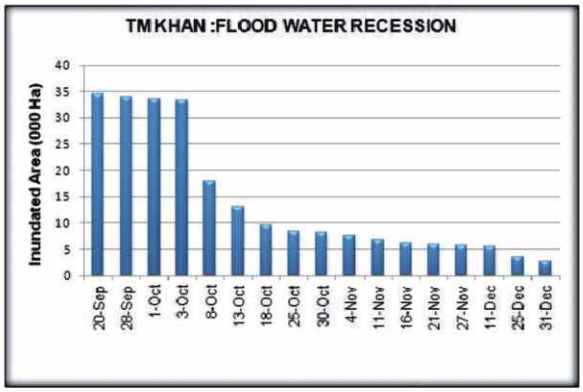


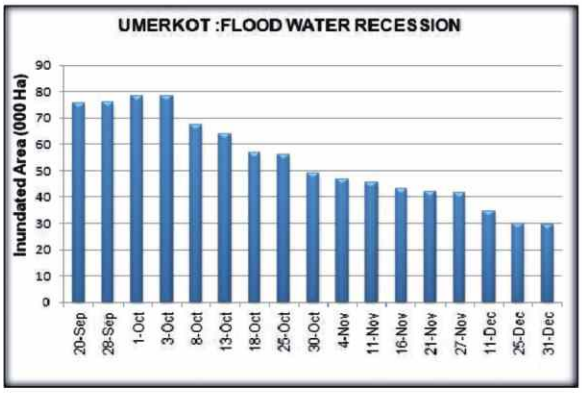
## Temporal recession of flood / rain water

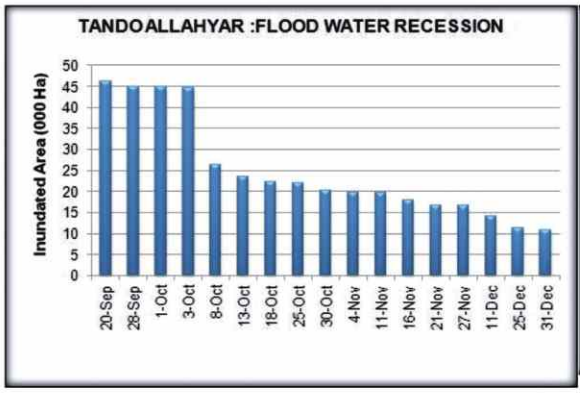


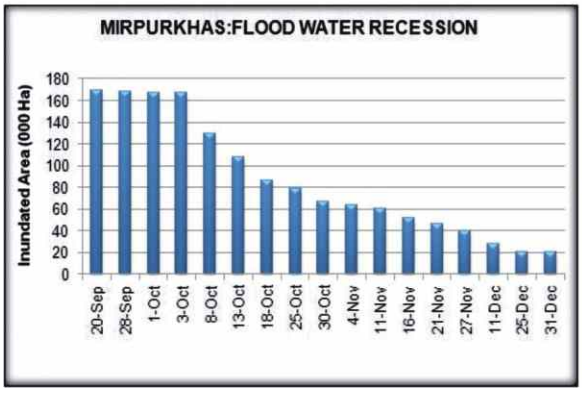



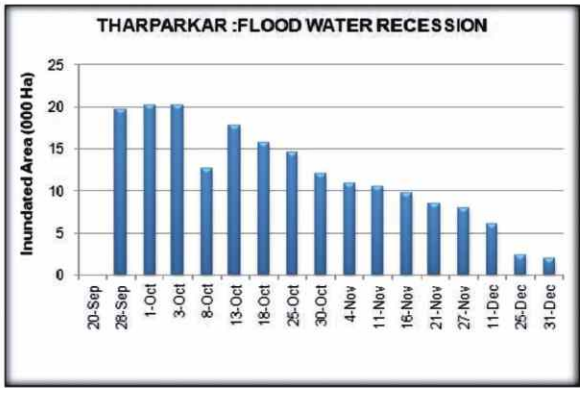



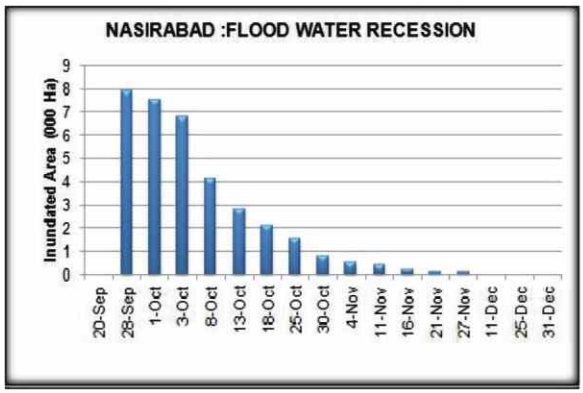



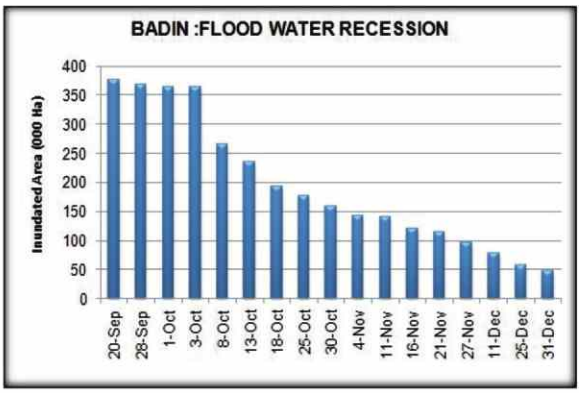



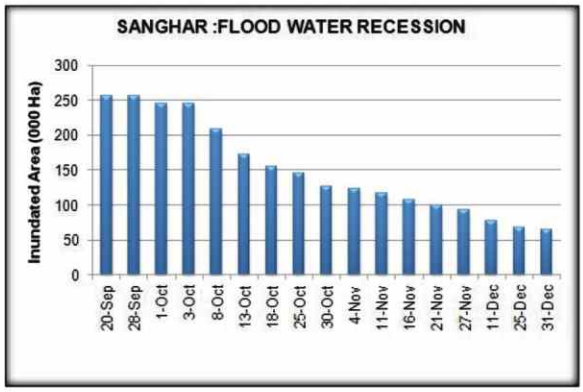



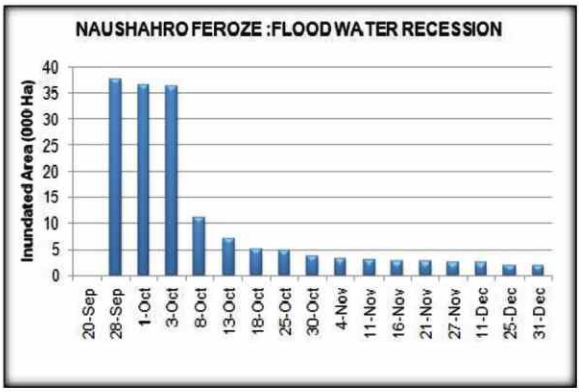



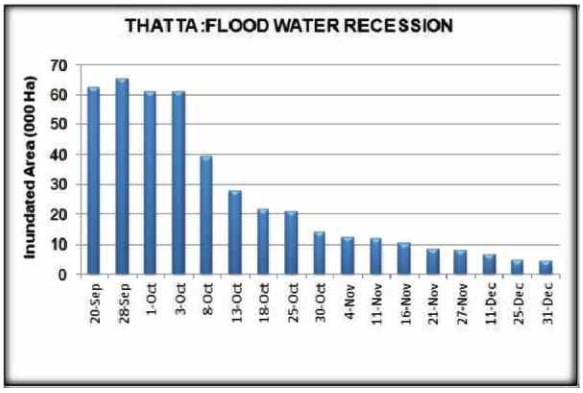




NASIRABAD :FLOOD WATER RECESSION
Inundated Area (000 Ha)
0
1
2
3
4
5
6
7
8
9
20-Sep
28-Sep
1-Oct
3-Oct
8-Oct
13-Oct
18-Oct
25-Oct
30-Oct
4-Nov
11-Nov
16-Nov
21-Nov
27-Nov
11-Dec
25-Dec
31-Dec

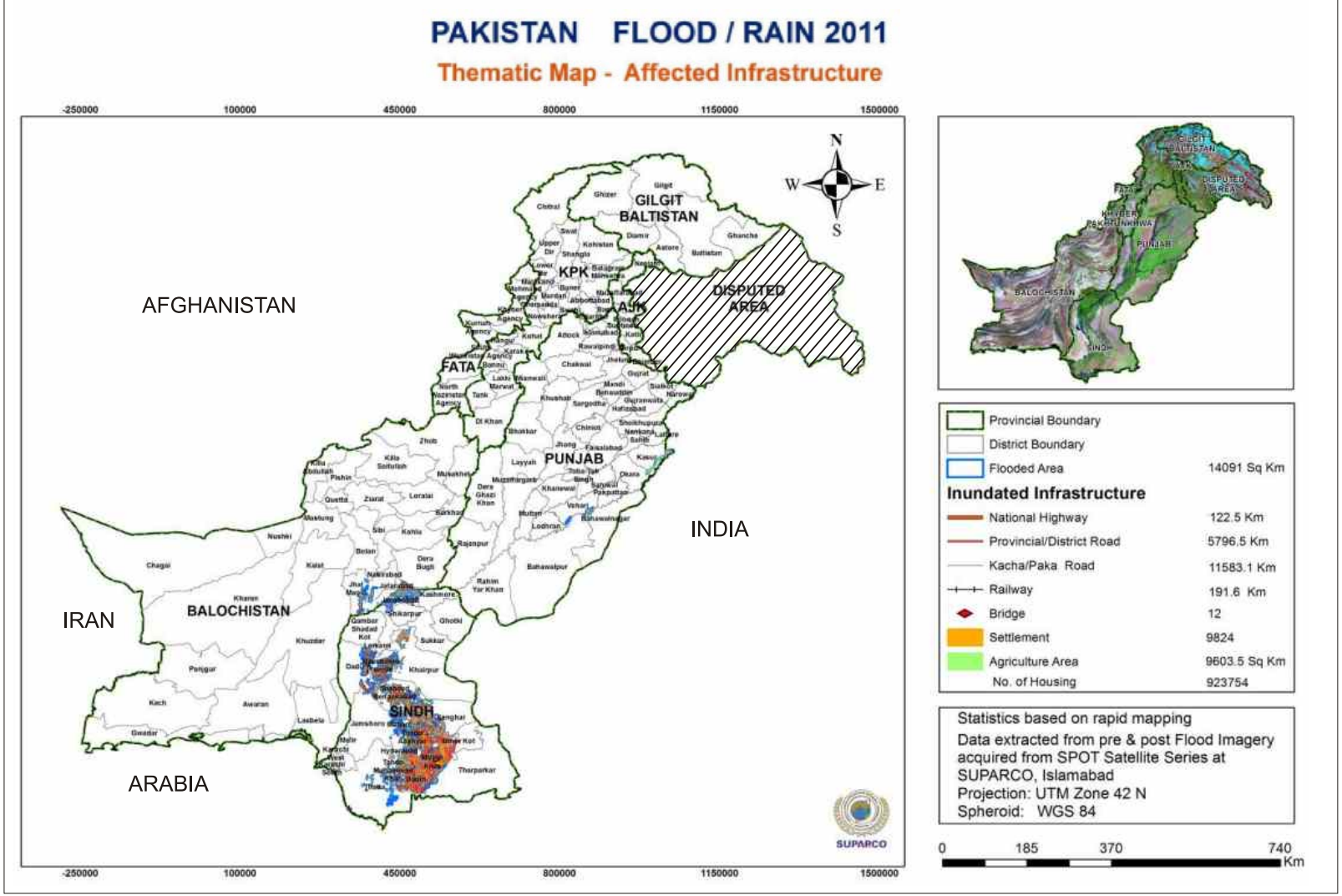

BADIN :FLOOD WATER RECESSION
Inundated Area (000 Ha)
0
50
100
150
200
250
300
350
400
20-Sep
28-Sep
1-Oct
3-Oct
8-Oct
13-Oct
18-Oct
25-Oct
30-Oct
4-Nov
11-Nov
16-Nov
21-Nov
27-Nov
11-Dec
25-Dec
31-Dec


SANGHAR :FLOOD WATER RECESSION
Inundated Area (000 Ha)
0
50
100
150
200
250
300
20-Sep
28-Sep
1-Oct
3-Oct
8-Oct
13-Oct
18-Oct
25-Oct
30-Oct
4-Nov
11-Nov
16-Nov
21-Nov
27-Nov
11-Dec
25-Dec
31-Dec

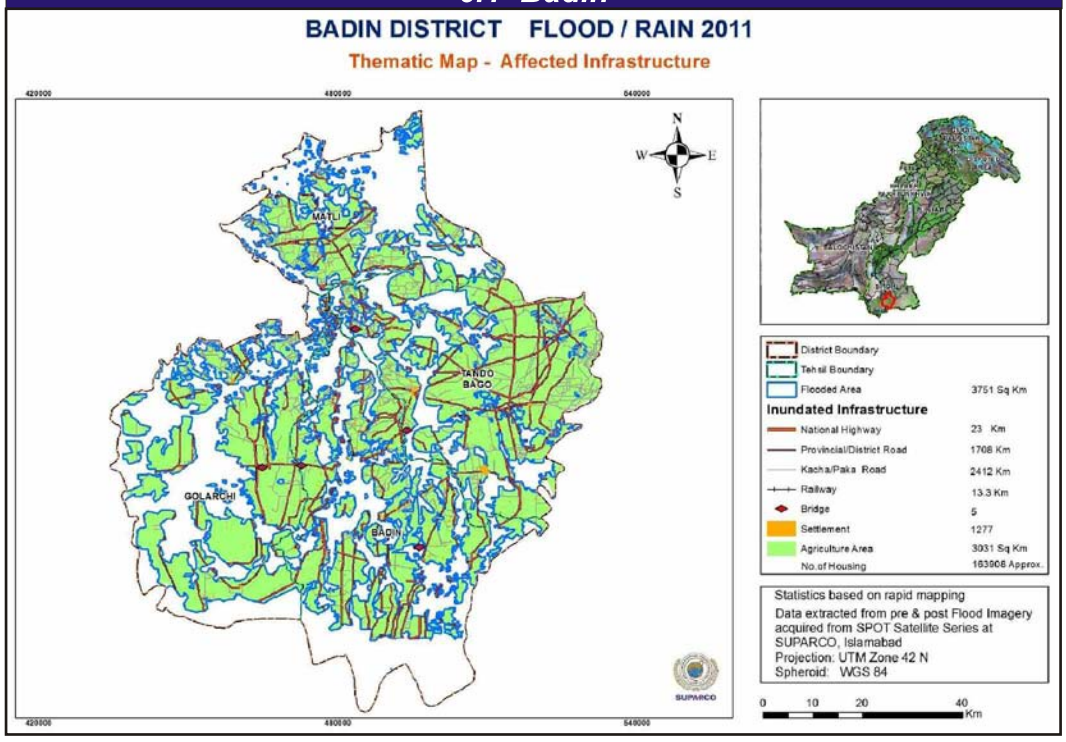

NAUSHAHRO FEROZE :FLOOD WATER RECESSION
Inundated Area (000 Ha)
0
5
10
15
20
25
30
35
40
20-Sep
28-Sep
1-Oct
3-Oct
8-Oct
13-Oct
18-Oct
25-Oct
30-Oct
4-Nov
11-Nov
16-Nov
21-Nov
27-Nov
11-Dec
25-Dec
31-Dec


THATTA :FLOOD WATER RECESSION
Inundated Area (000 Ha)
0
10
20
30
40
50
60
70
20-Sep
28-Sep
1-Oct
3-Oct
8-Oct
13-Oct
18-Oct
25-Oct
30-Oct
4-Nov
11-Nov
16-Nov
21-Nov
27-Nov
11-Dec
25-Dec
31-Dec

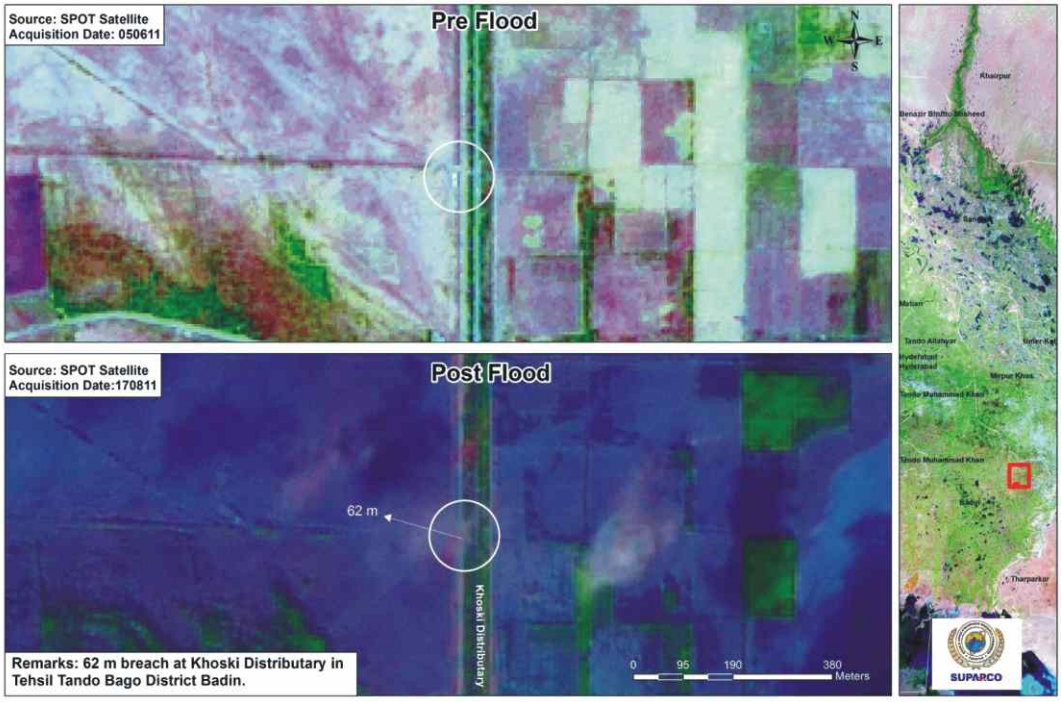
## 6.0 Thematic Maps



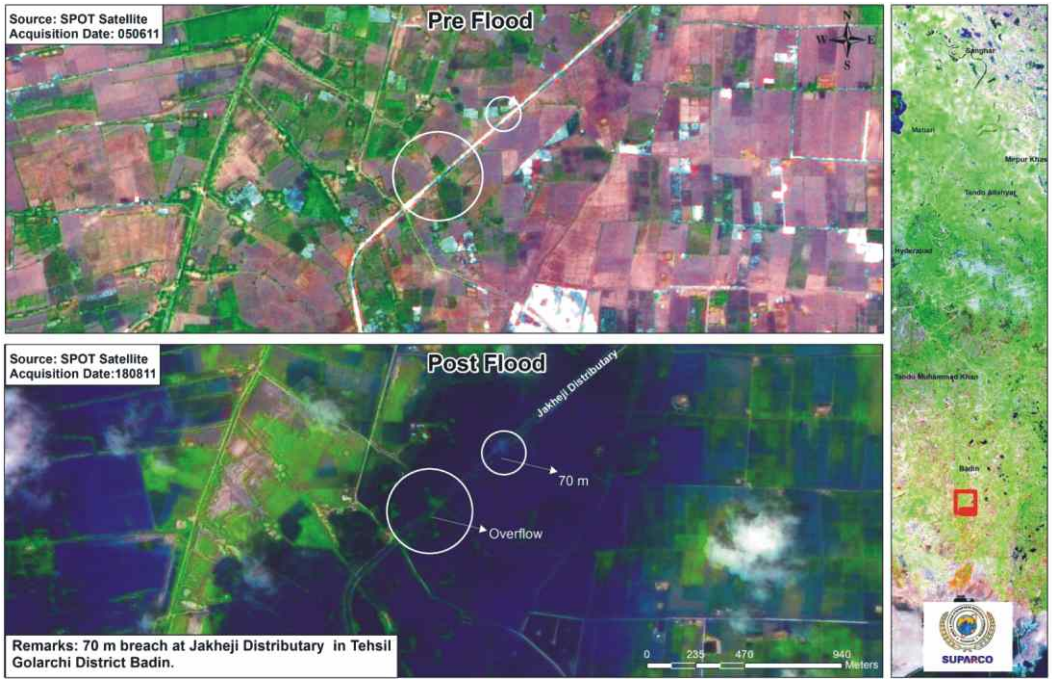
## 6.1 Badin



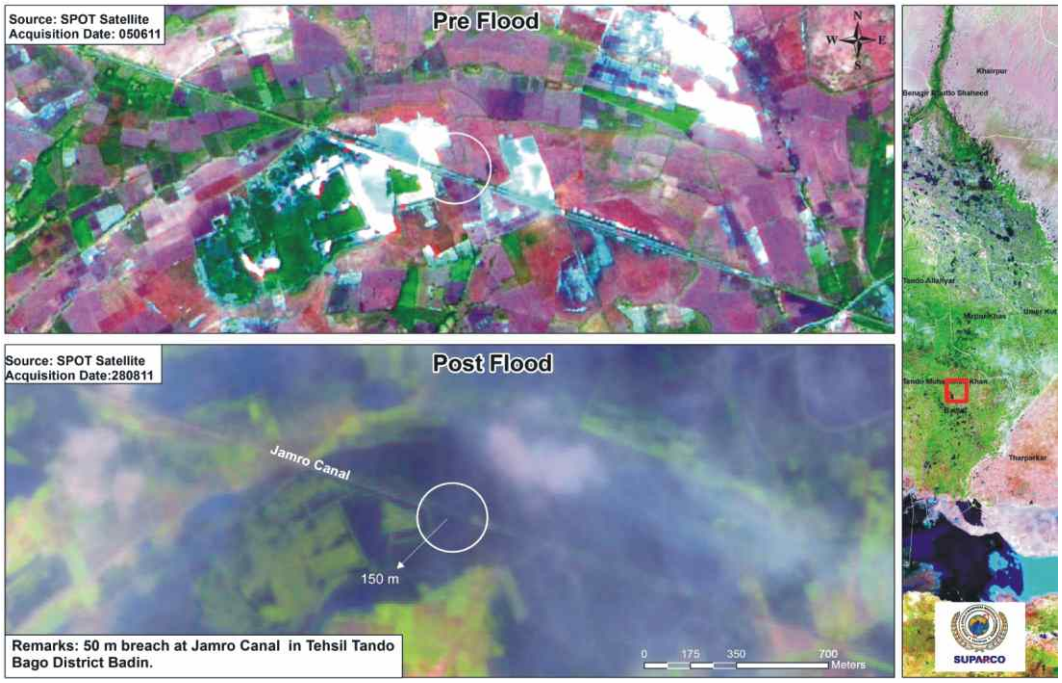

## Canal Breaches - District Badin



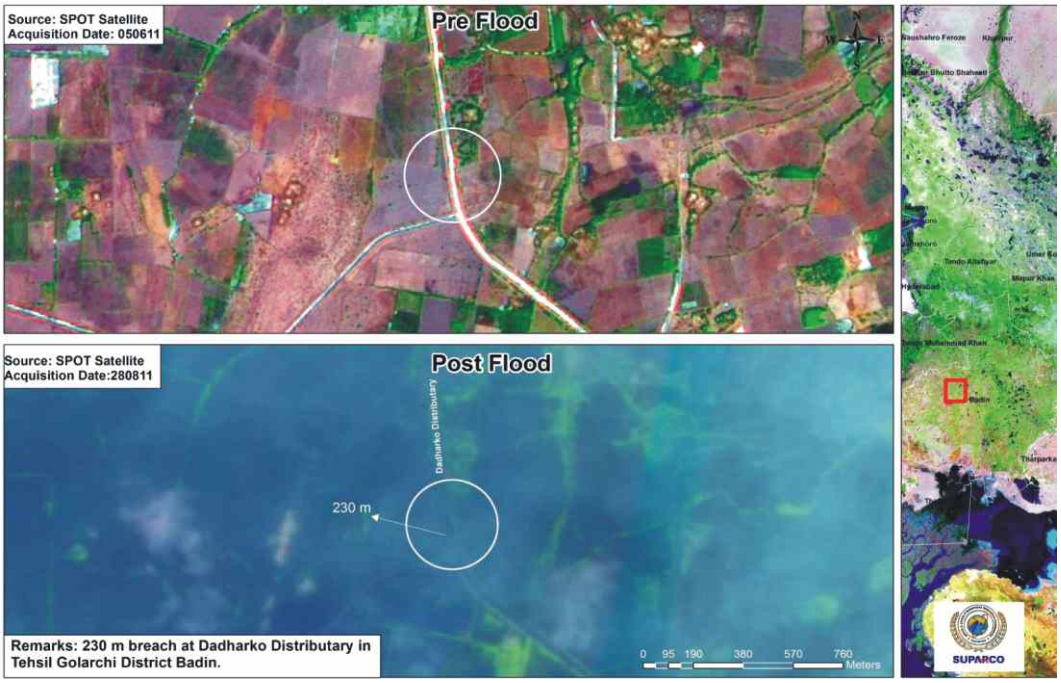
## Canal Breaches & Overflow - District Badin




## Canal Breaches - District Badin

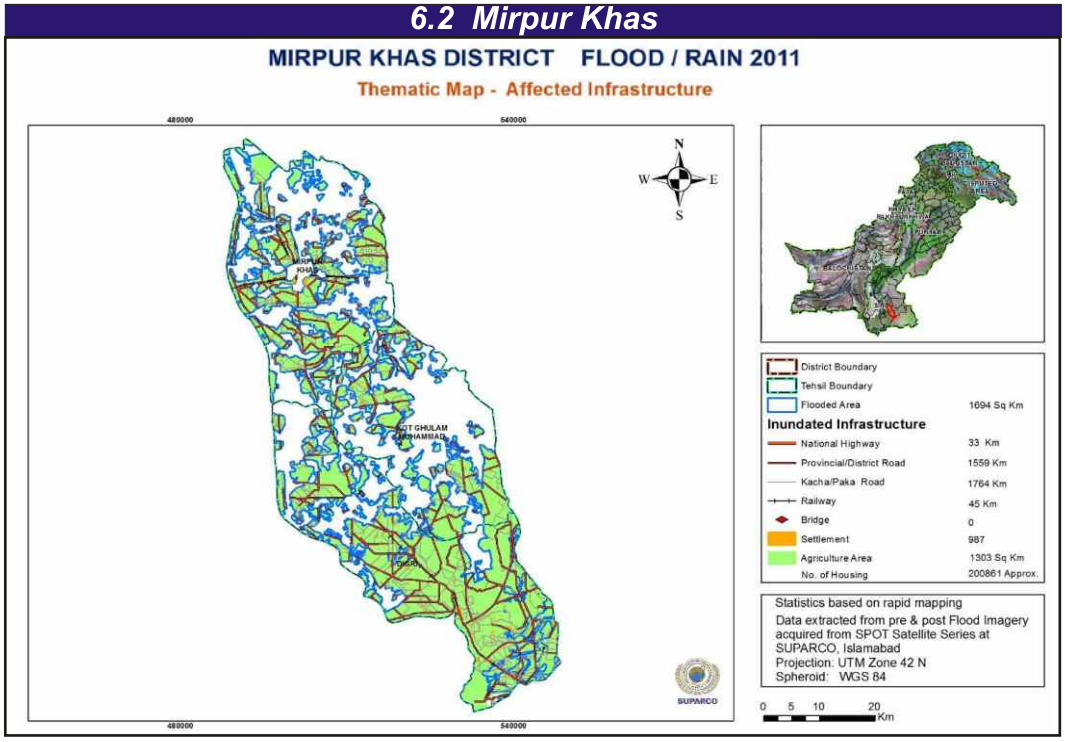


## Canal Breaches - District Badin

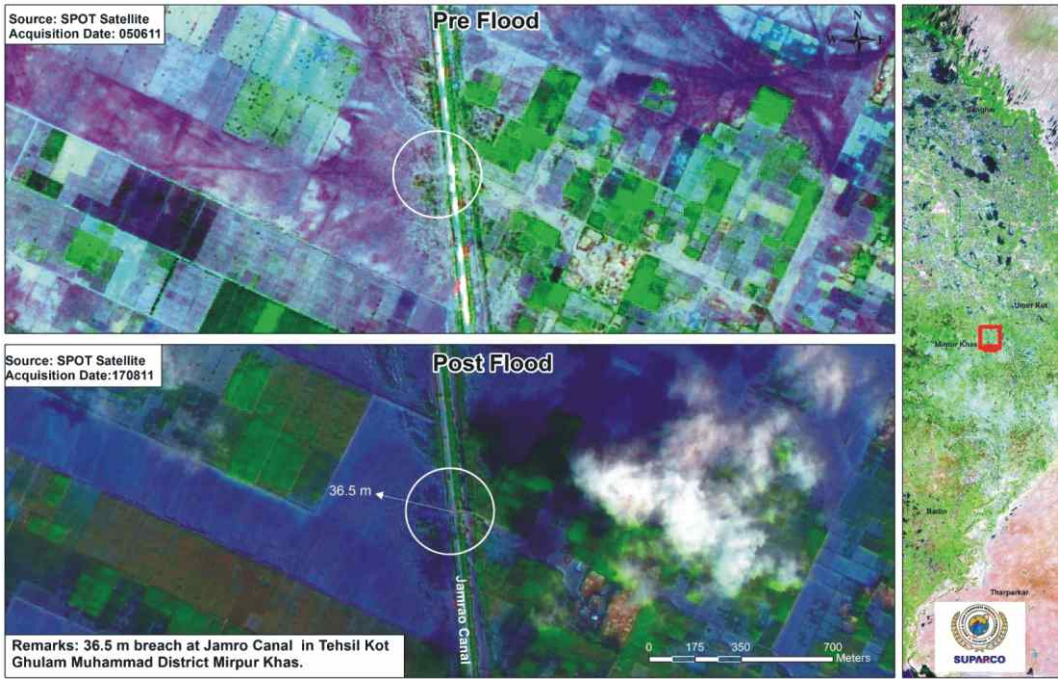



## Canal Breaches and Overflow - District Badin

## 6.2 Mirpur Khas

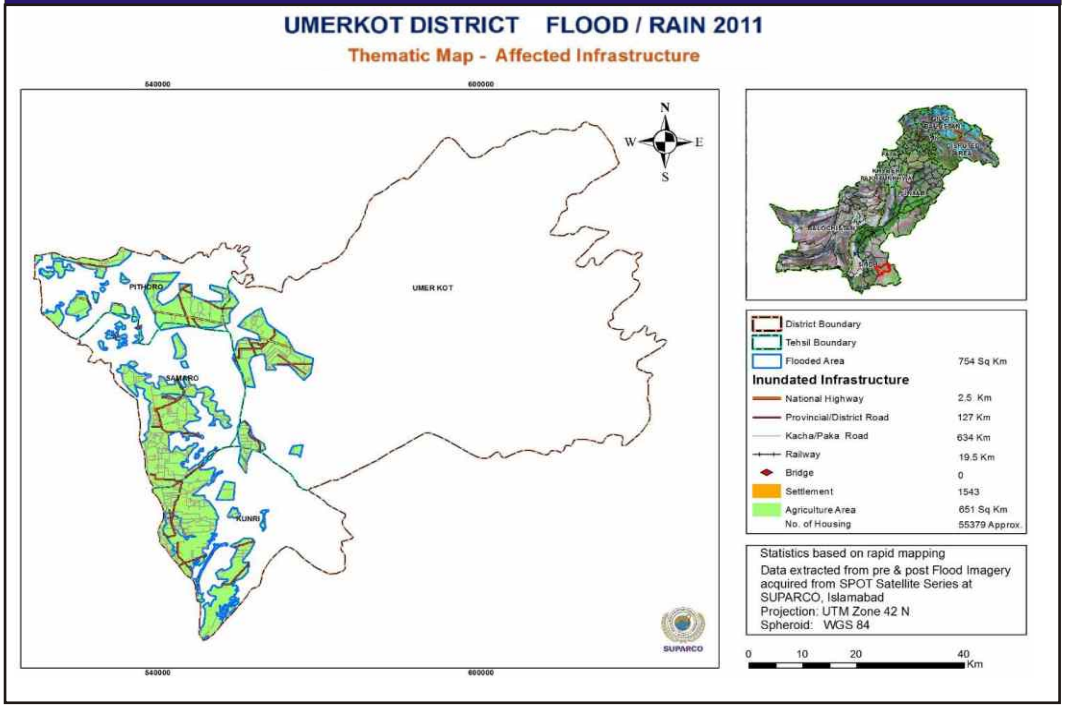



## Canal Breaches - District Mirpurkhas

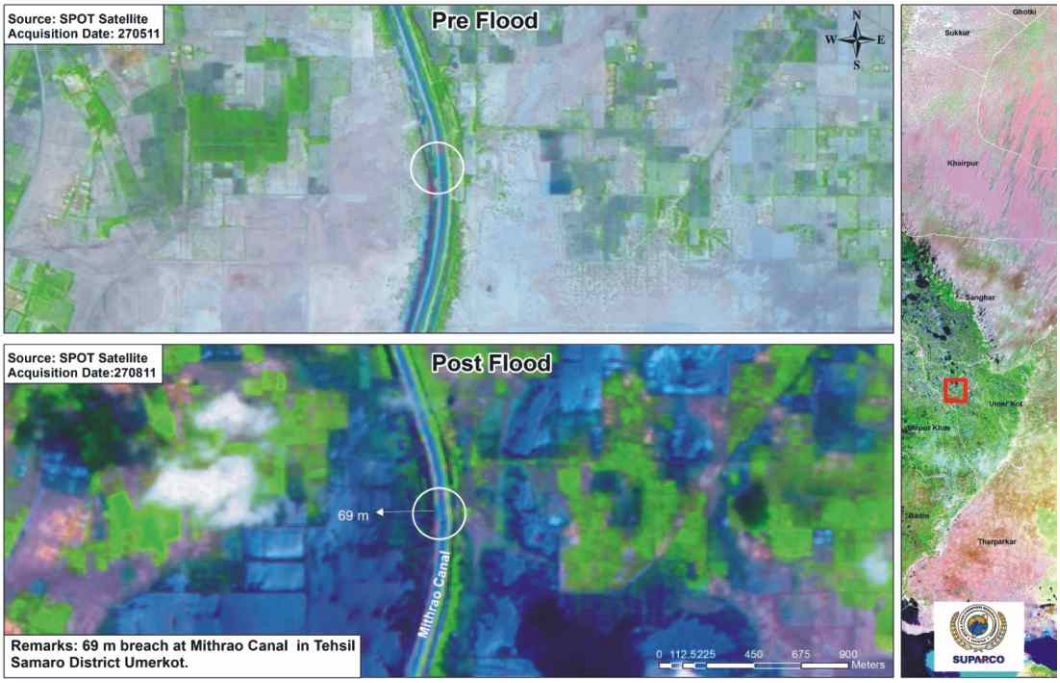


## Canal Breaches - District Mirpurkhas

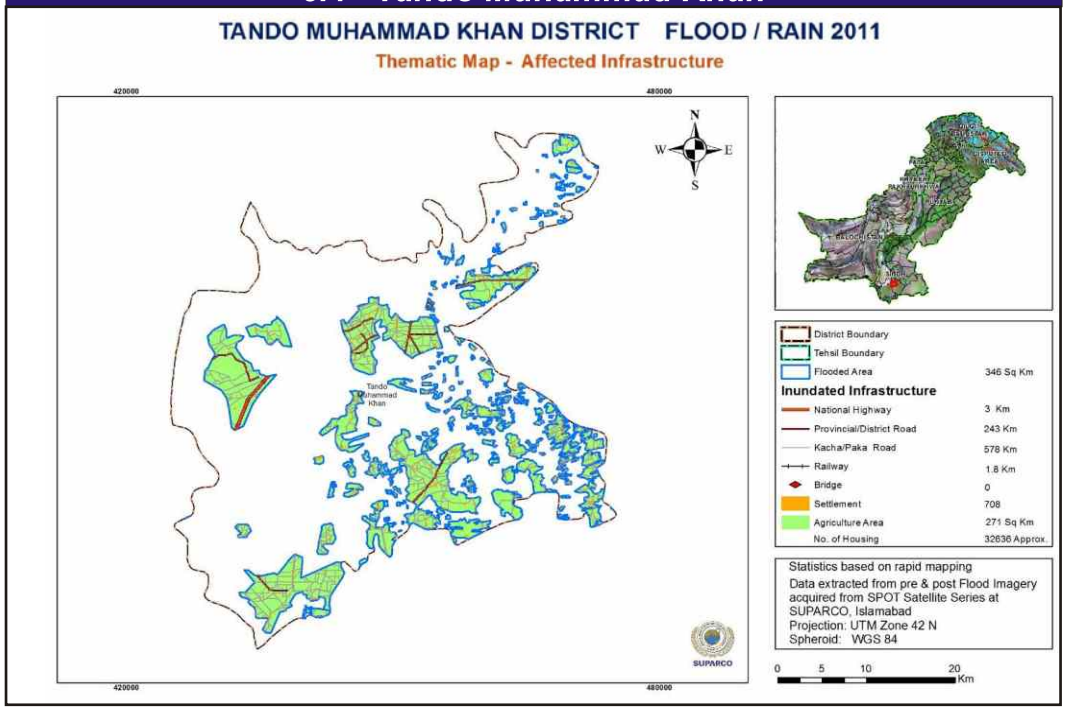

## 6.3 Umerkot



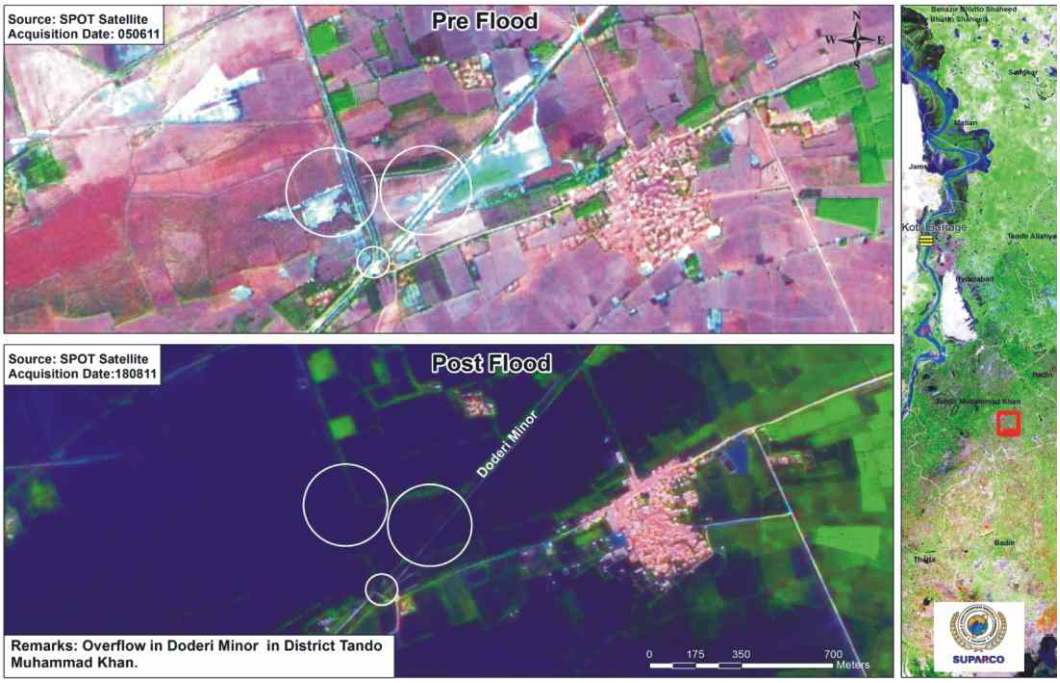
## Canal Breaches - District Umerkot



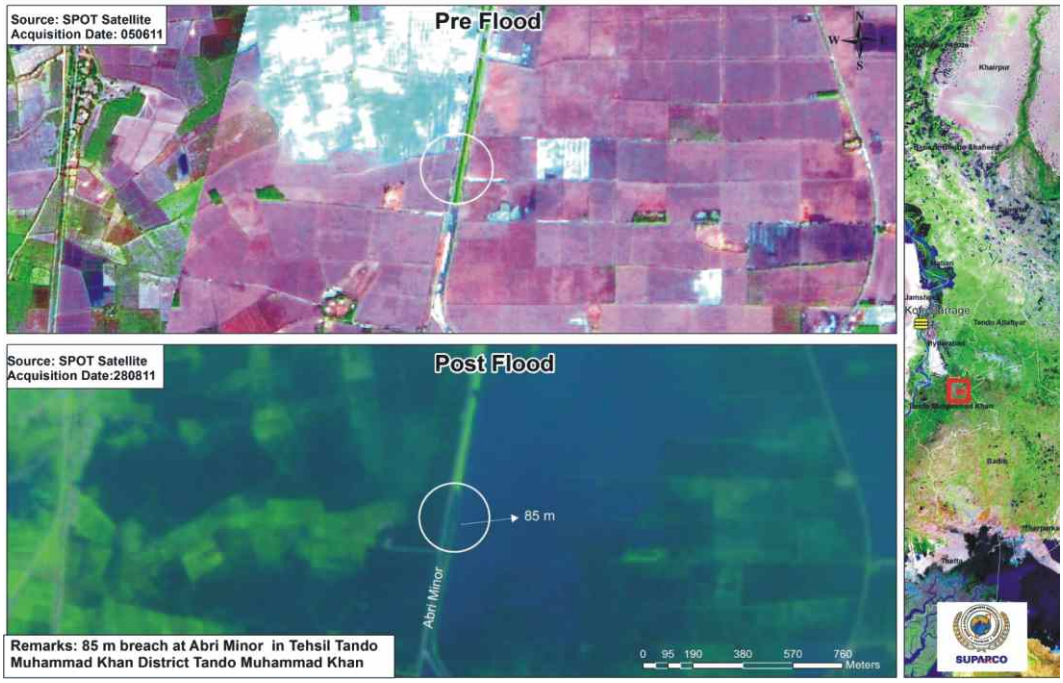

## 6.4 Tando Muhammad Khan



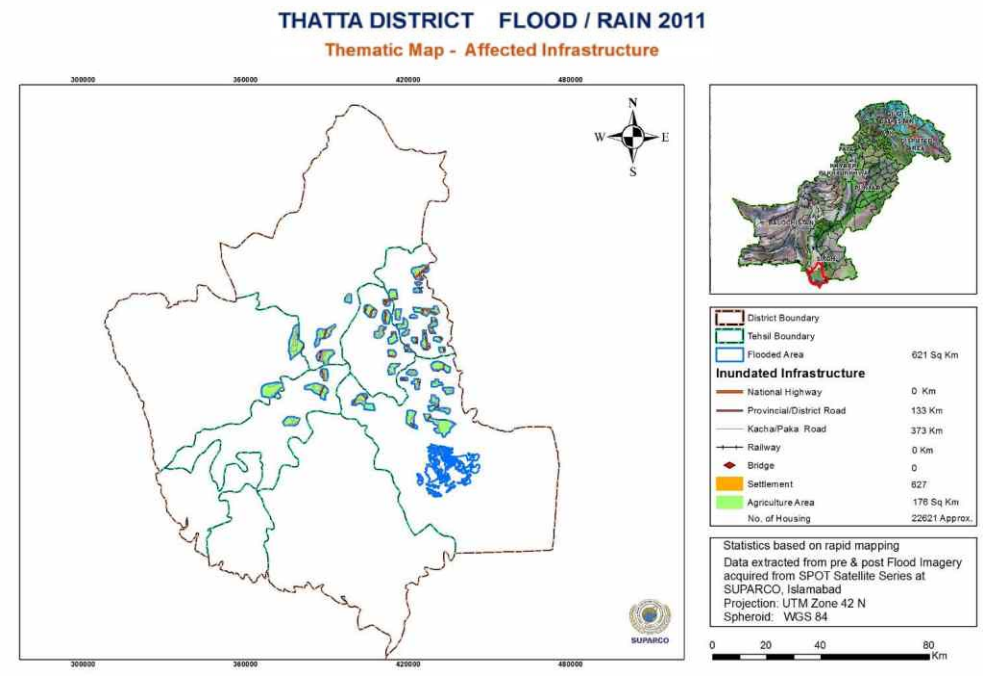
## Canal Overflow - District Tando Muhammad Khan



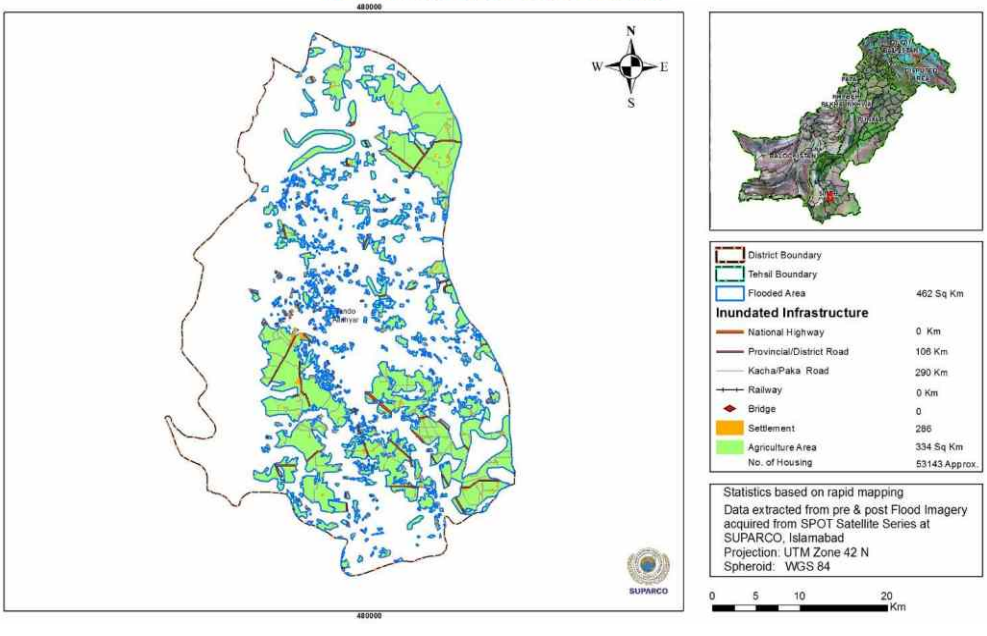

## Canal Breaches - District Tando Muhammad Khan



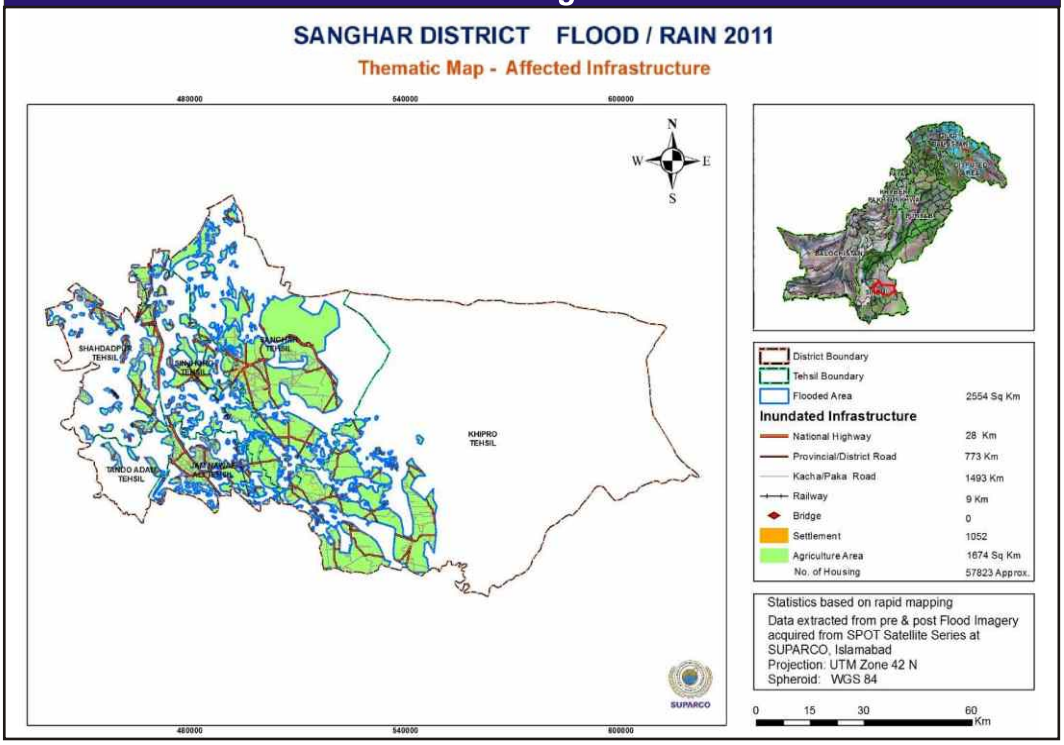
## 6.5 Thatta



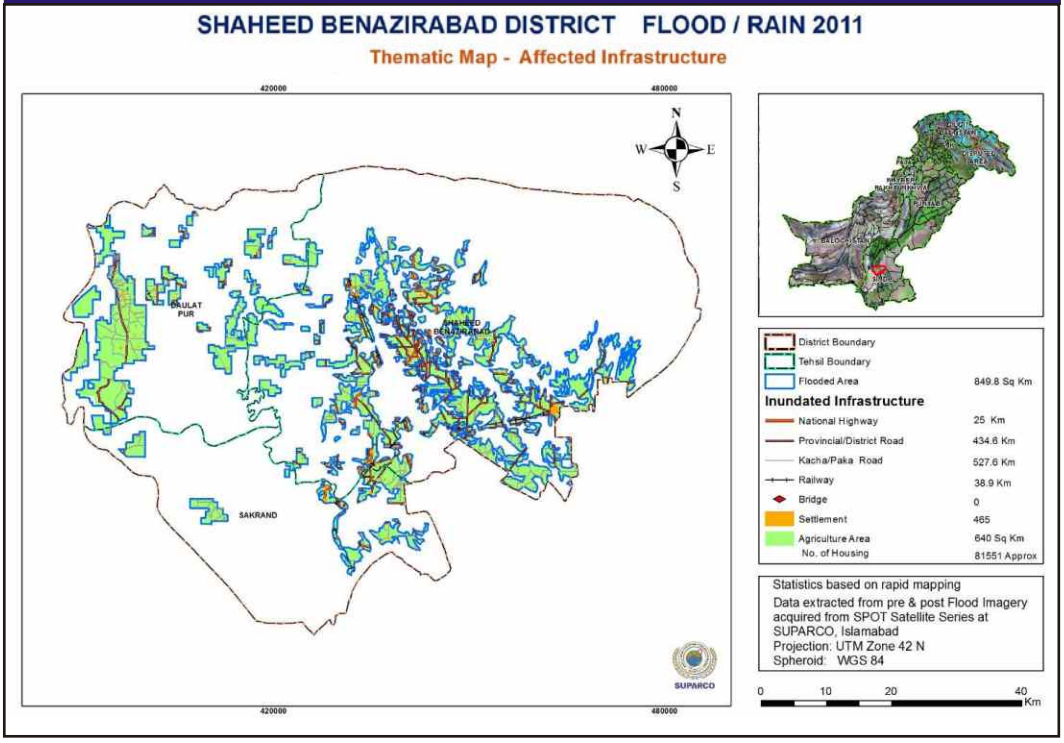

## 6.6 Tando Allah Yar



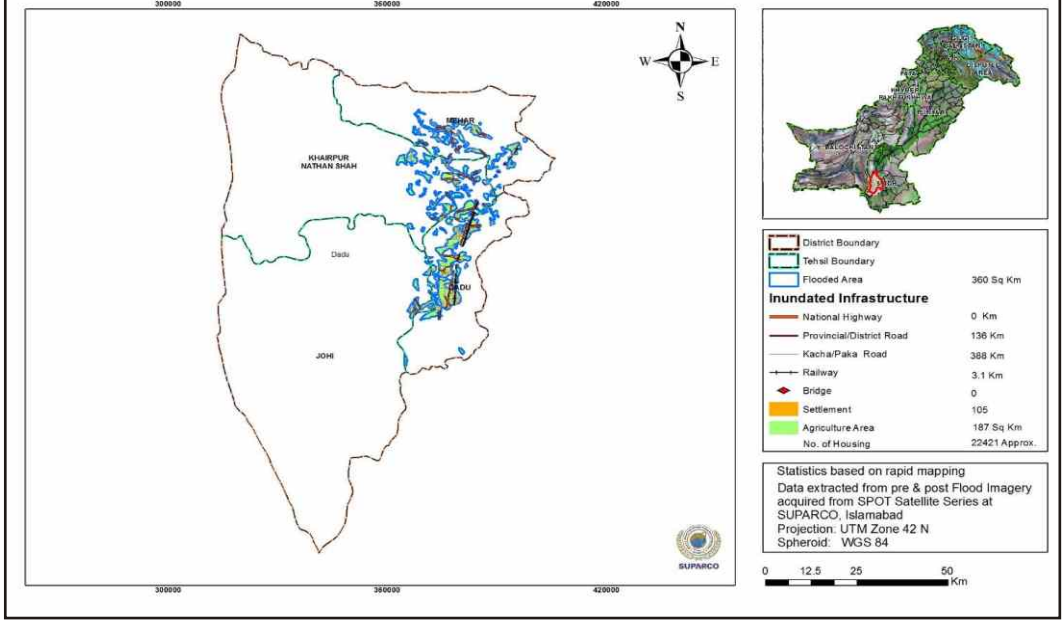
## 6.7 Sanghar



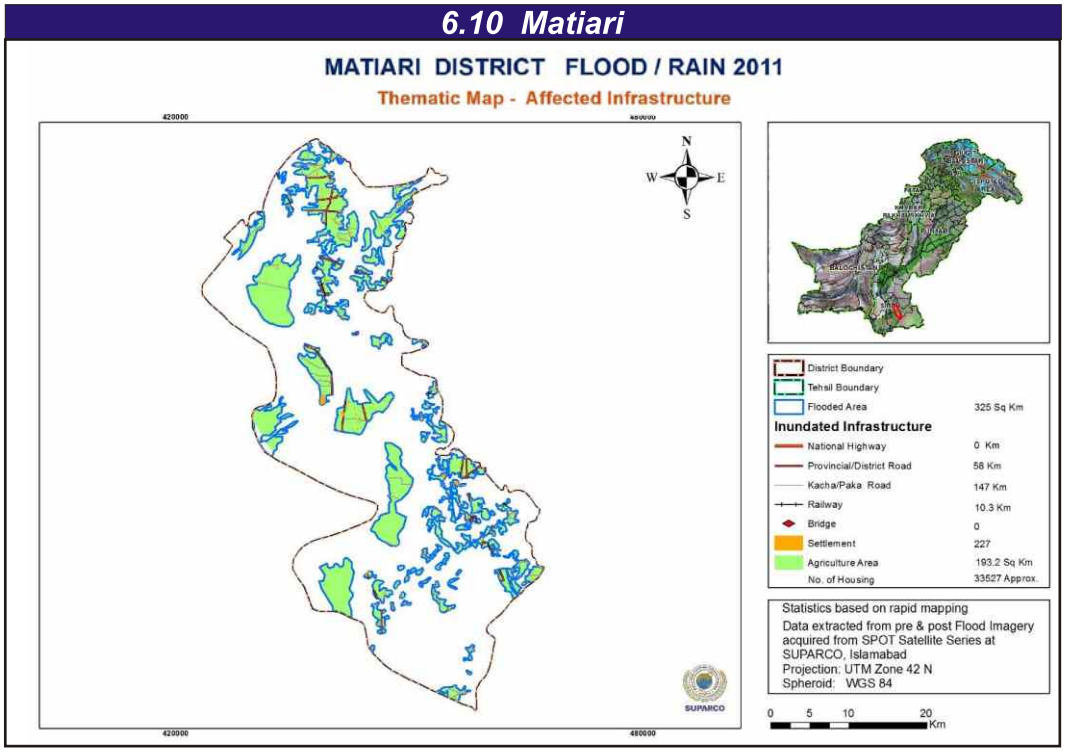

## 6.8 Shaheed Benazir Abad



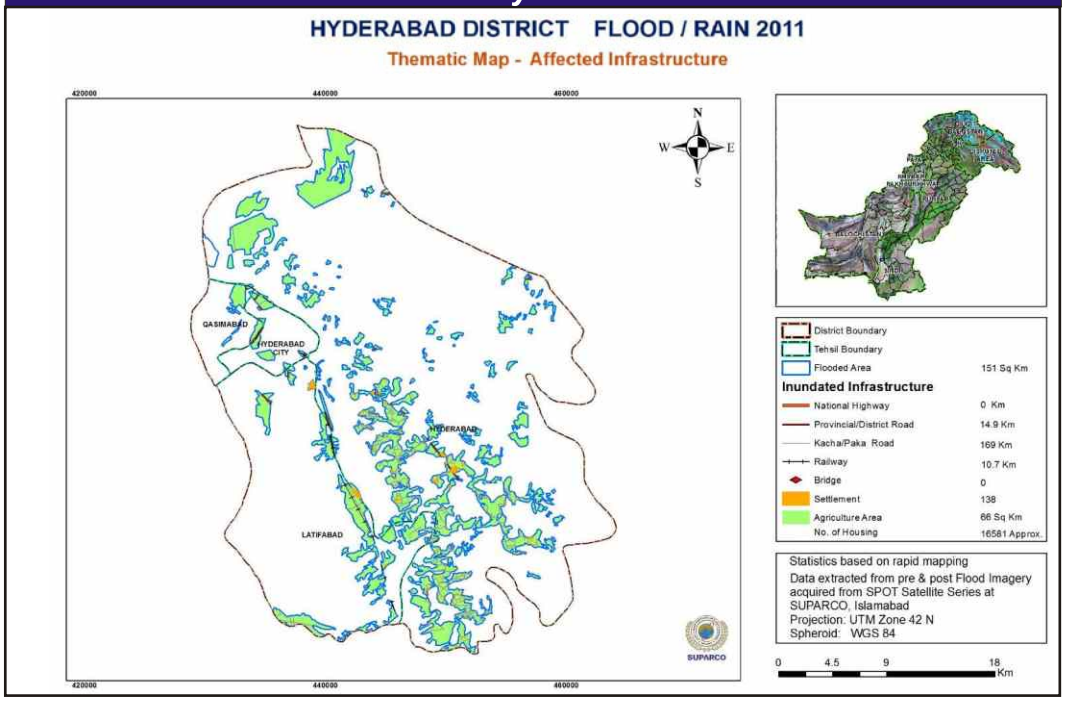
## 6.9 Dadu



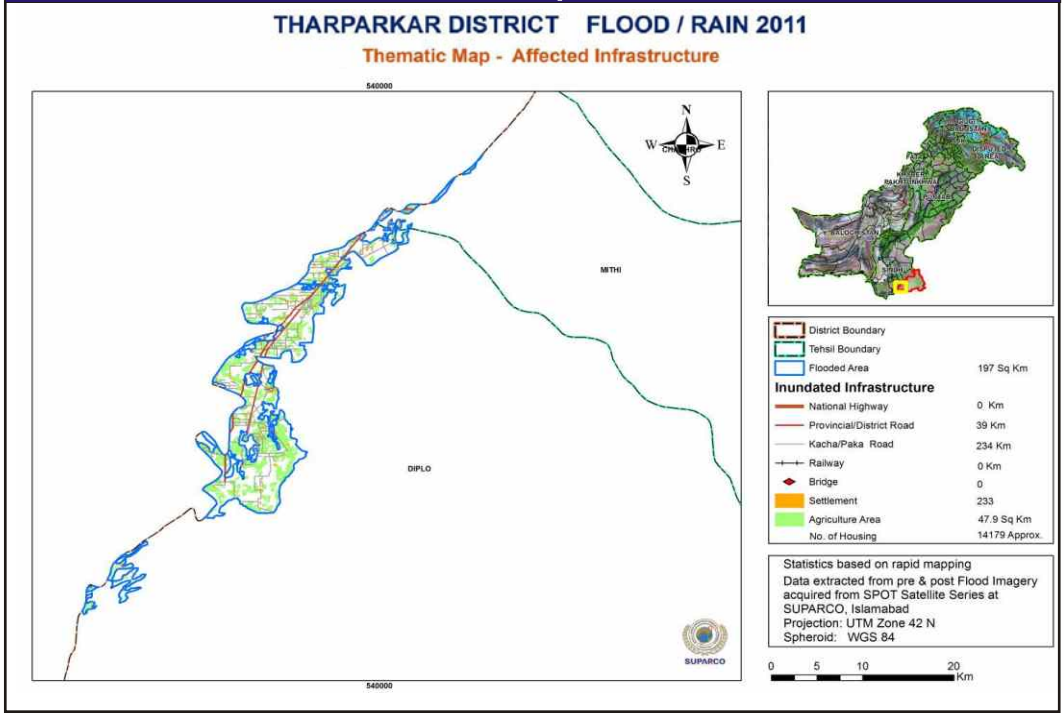

## 6.10 Matiari



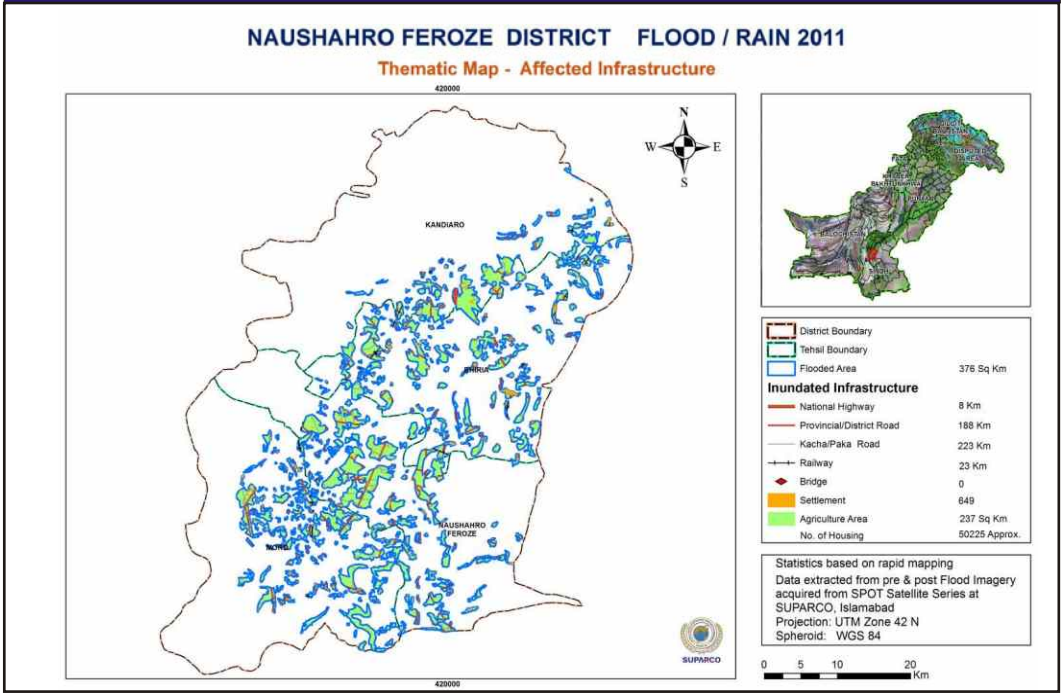
## 6.11 Hyderabad



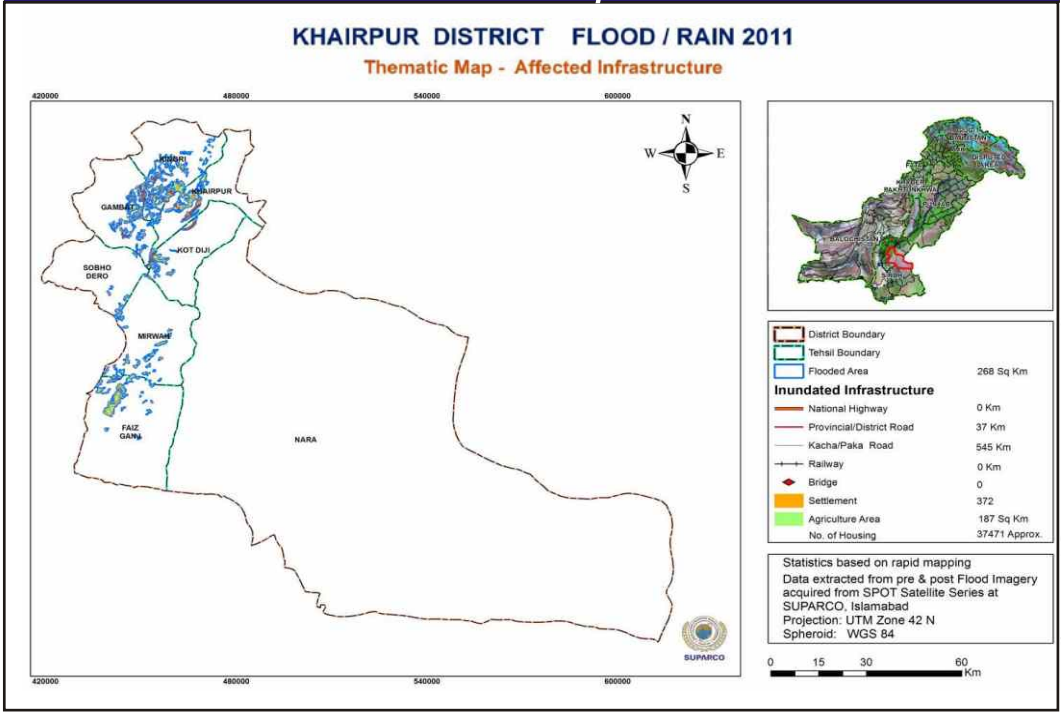

## 6.12 Tharparkar



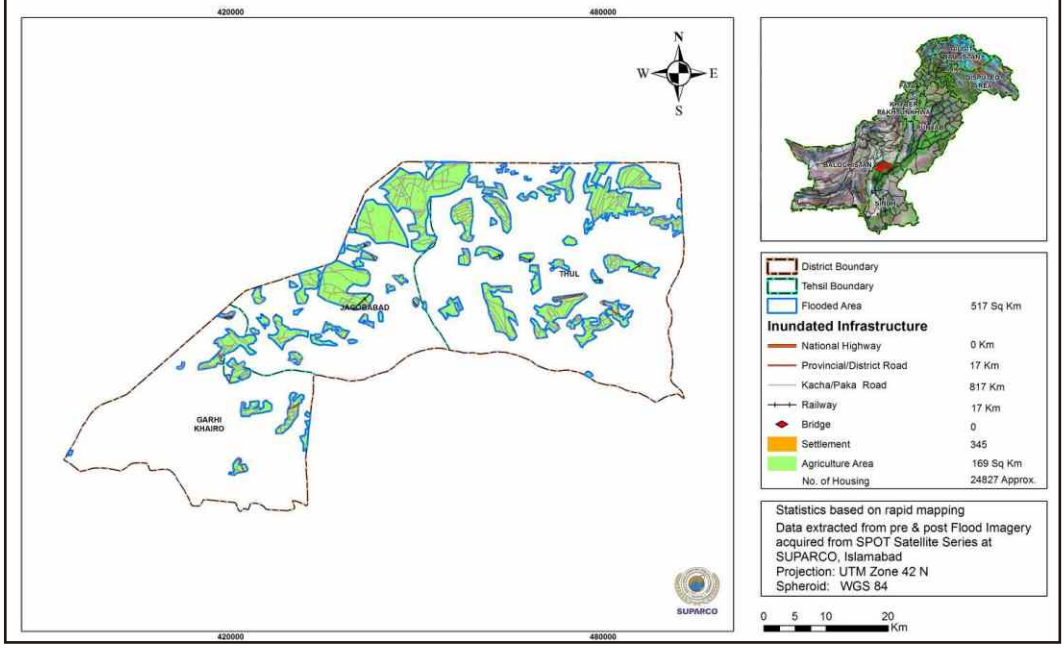
## 6.13 Naushahro Feroze



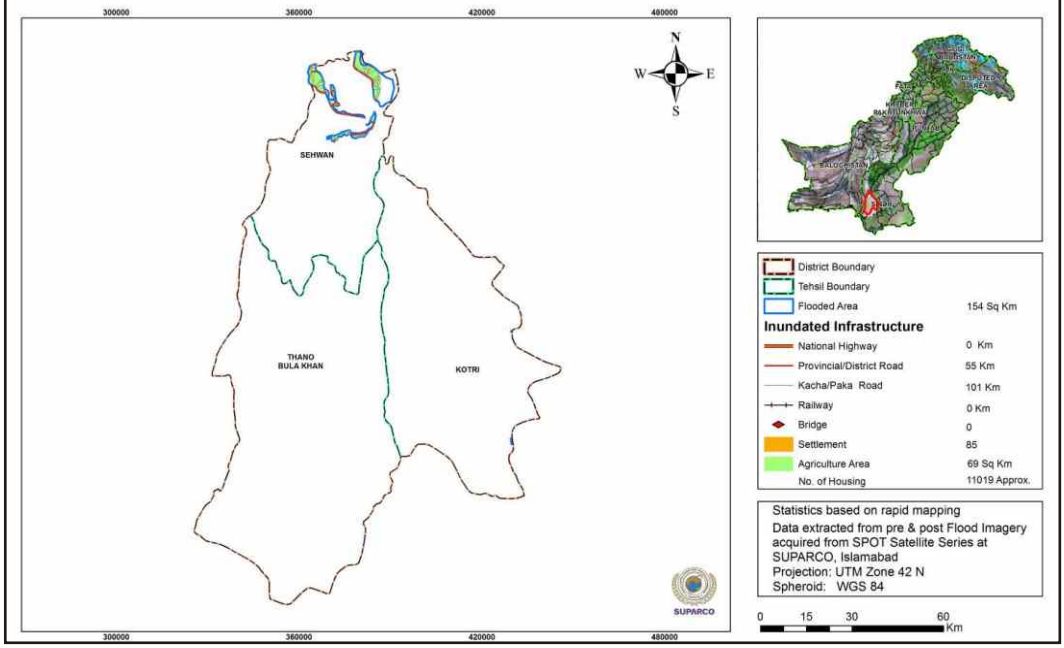

## 6.14 Khairpur



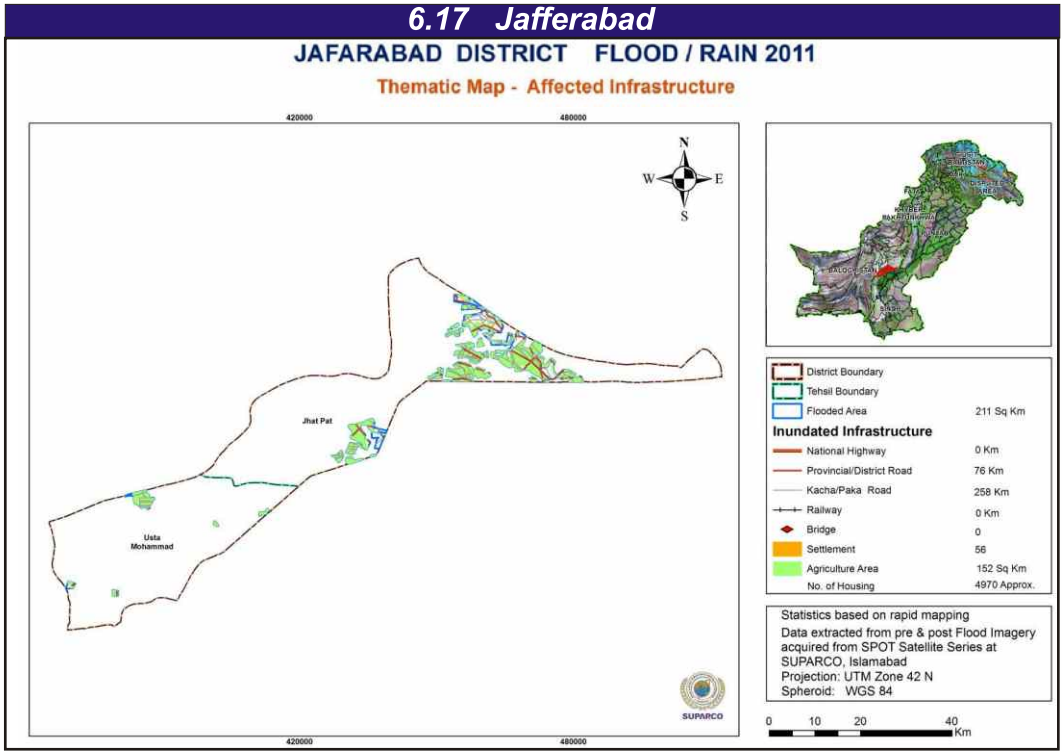
## 6.15 Jacobabad



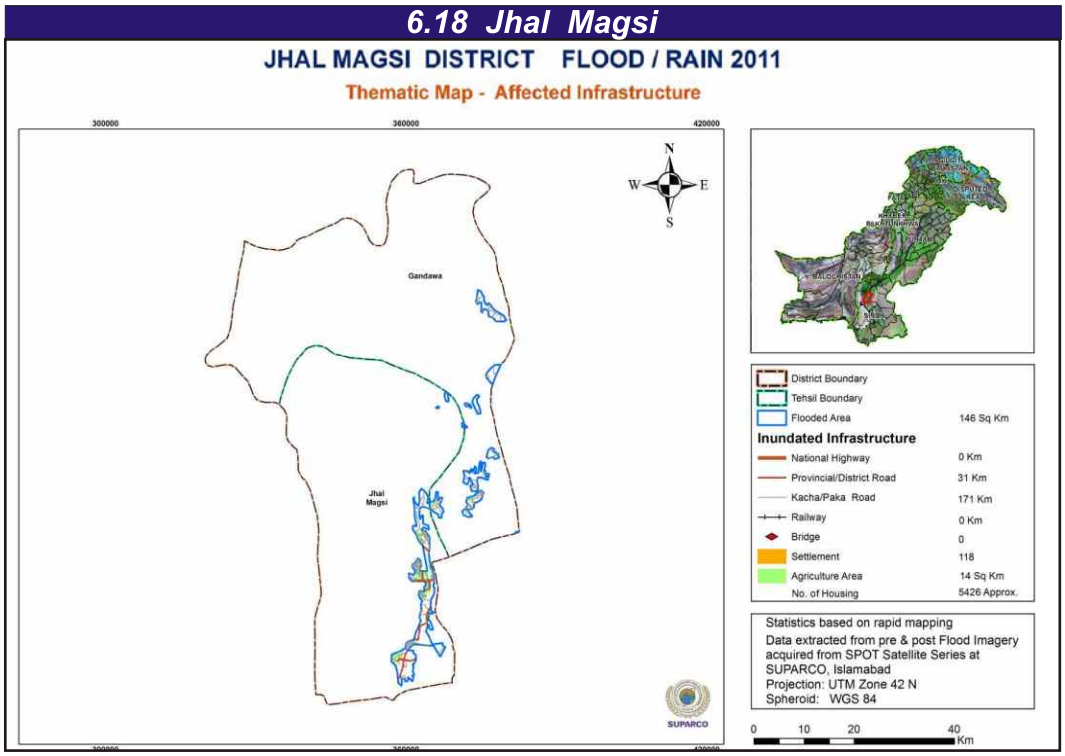

## 6.16 Jamshoro



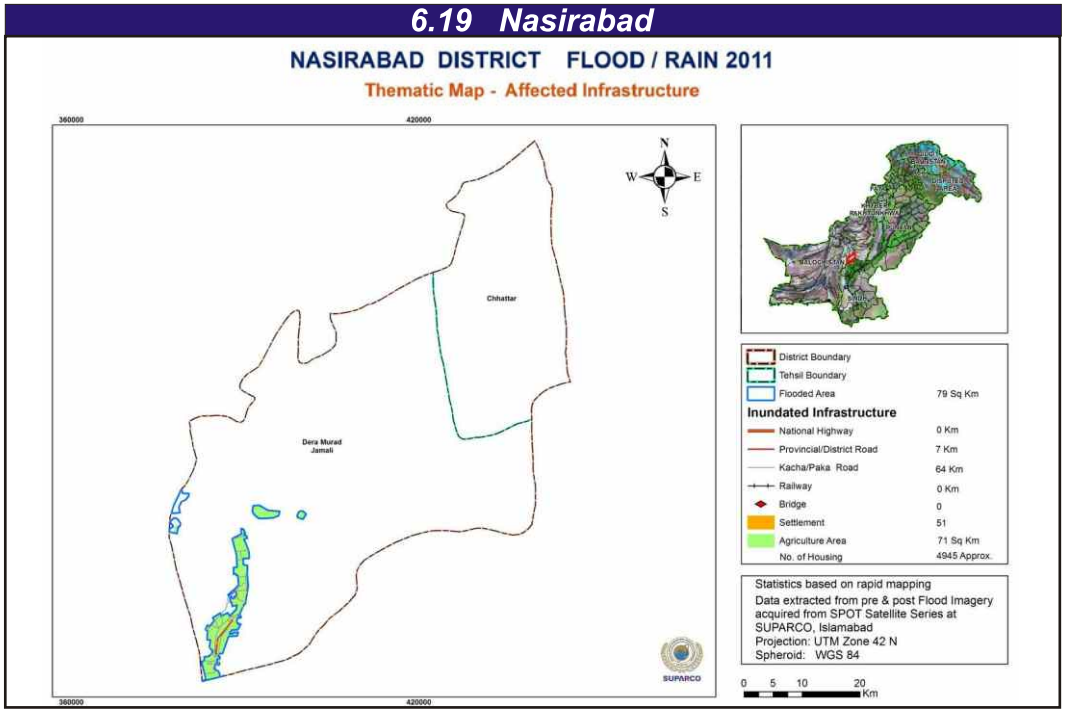
## 6.17 Jafferabad



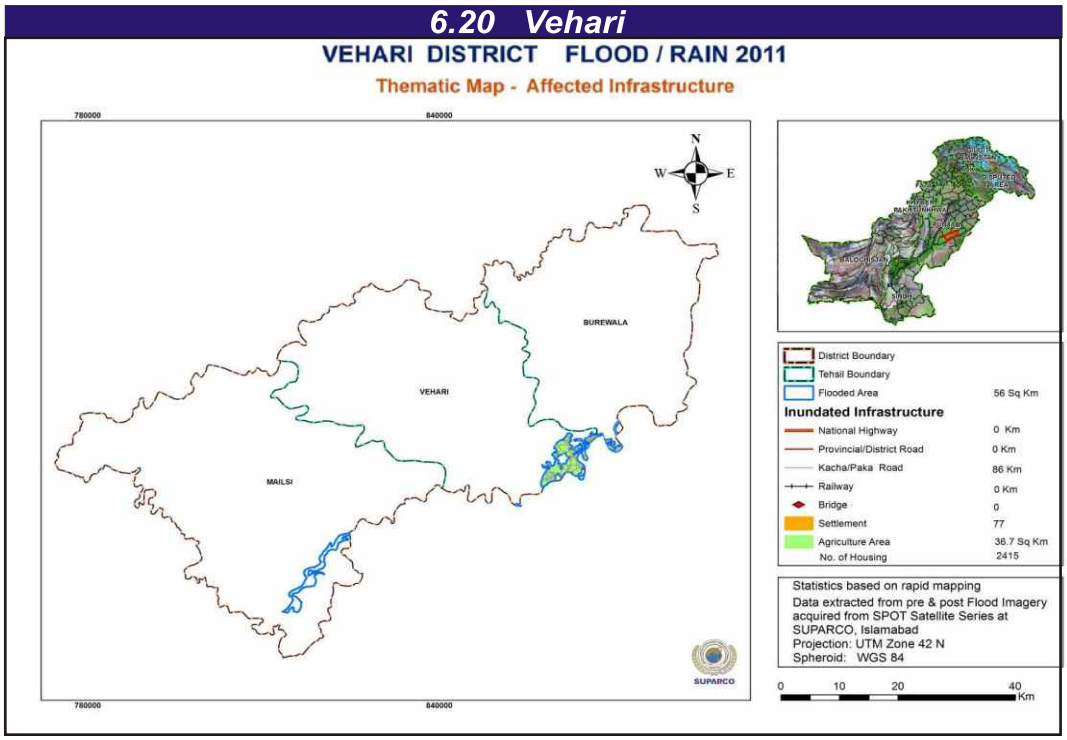

## 6.18 Jhal Magsi



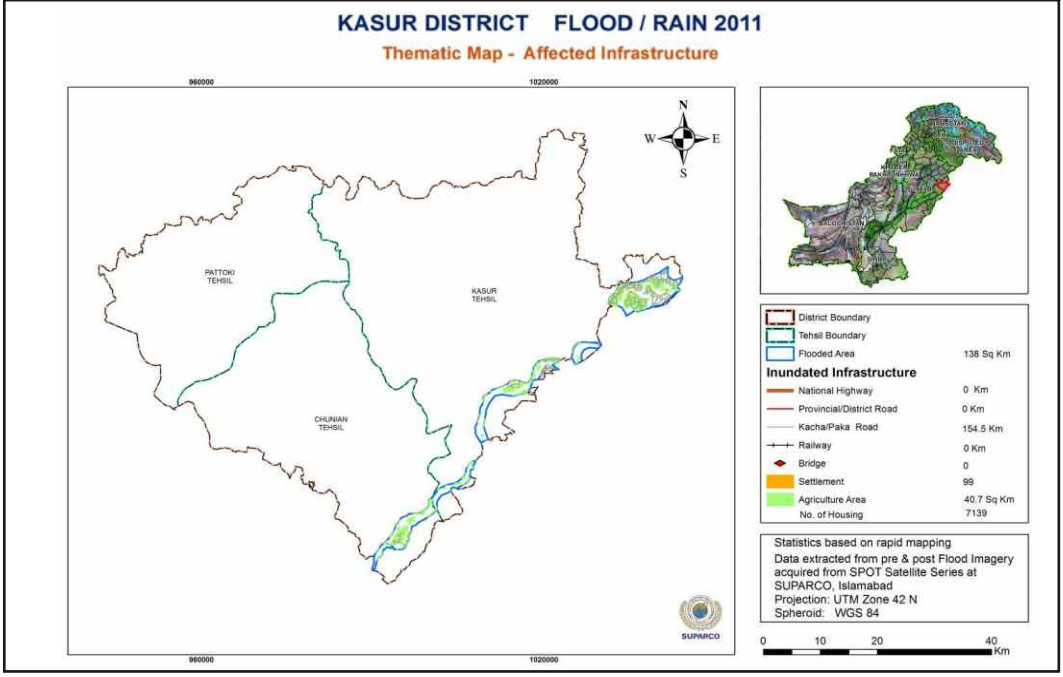
## 6.19 Nasirabad




## 6.20 Vehari



## 6.21 Kasur




## 6.22 Bahawalnagar