India Meteorological Department
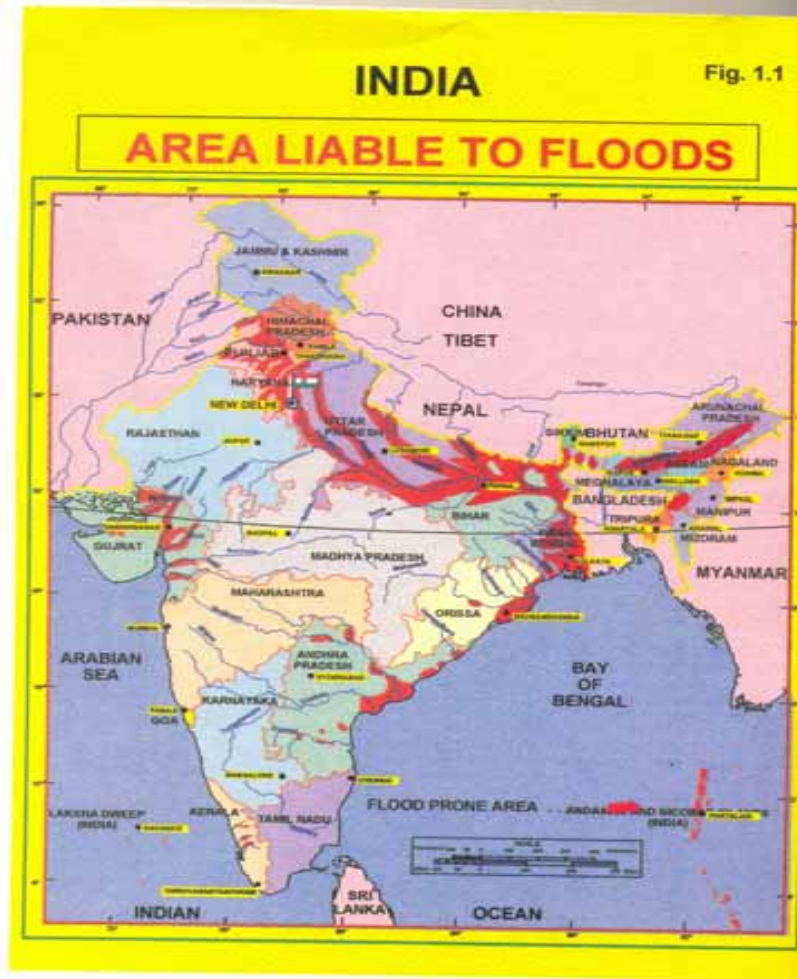

ASIAN WATER CYCLE
SYMPOSIUM

January 9- 10 , 2007.

N.Y.APTE (Director)

Proposal

- **IMD is proposing to work on improvement in methodology of**

   "Quantitative Precipitation Forecast" (QPF) for Flood Forecasting,

   With following background on

   Flood Forecasting system in India

FLOOD PRONE AREAS in INDIA

FLOODS in INDIA

Flood is an ANNUAL FEATURE of major rivers.

Maximum floods Occur in S-W MONSOON season.

It is estimated that about 400000 SQ. KM of area is FLOOD PRONE . Out of this about 25% is now FLOOD PROTECTED.

On an average 75000 SQ. KMS of area & 33million population faces FLOOD WRATH every year.

In past 50 years India had lost assets of more than RS 650000 million (@ US$ 14800 million) and loss of more than 75000 human lives due to floods alone.

HIGH LEVEL COMMITTEES CONSTITUTED TO STUDY PROBLEM OF FLOODS

- **POLICY STATEMENT- 1954**

- **HIGH LEVEL COMMITTEE ON FLOODS- 1957**

- **POLICY STATEMENT- 1958**

- **MINISTERIAL COMMITTEE ON FLOOD CONTROL- 1964**

- **MINISTERIAL COMMITTEE ON FLOODS &FLOOD RELIEF-1972**

- **WORKING GROUPS ON FLOOD CONTROL FOR FIVE YEARS PLANS**

- **RASHTRIYA BARH AYOG – 1980**

- **NATIONAL WATER POLICY – 1987**

- **NATIONAL COMMISSION FOR INTEGRATED WATER RESOURCE PLAN DEVELOPMENT - 1996**

EXPERT COMMITTEE' s Opinion

- **Though total immunity from floods is not feasible, the losses particularly of lives and movable property can be minimized by**

  - Structural Measures

  - Effective Flood Forecasting / warning System.

ORAGANISATIONS DEALING FLOODS

- **FLOOD CONTROL DEPARTMENTS OF STATES**
- **CENTRAL WATER COMMISSION**
- **INDIA METEOROLOGICAL DEPTT.**
- **GANGA FLOOD CONTROL COMMISSION**
- **BRAHAMPUTRA BOARD**
- **MIN. OF AGRICULTURE**
- **STATE CRISES MANAGEMENT GROUPS**

CAUSES OF FLOOD

- [HEAVY RAINS IN SHORT PERIOD](#)
- LANDSLIDES AND AVALANCHES
- CHANGE IN RIVER MORPHOLOGY
- FAILURE OF DAMS AND OTHER HYDRAULIC STRUCTURES
- ENCROACHMENT IN FLOOD PLAIN AREAS
- CYCLONES,THUNDERSTORMS, CLOUD BURSTS
- GLACIAL OUT BURST

However **majority** of floods occur due to Heavy rains in short period. Hence accurate QPF is a prime factor of reasonable Flood forecasting and warning.
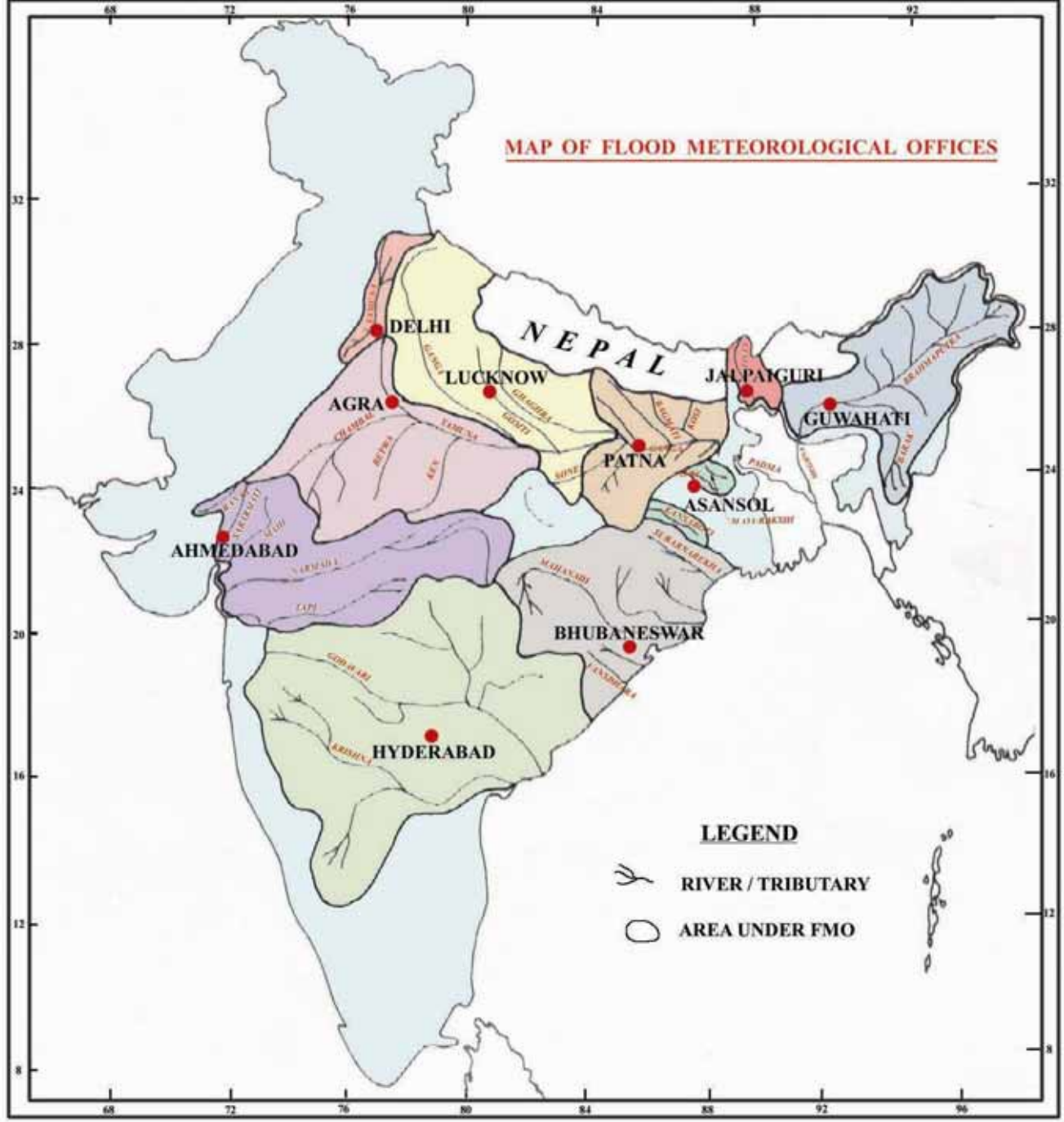
FLOOD FORECATING in INDIA

In India flood warning activity is 2 tier amongst

India meteorological Department
and Central Water Commission.

IMD is providing Quantitative Precipitation Forecast (QPF) through 10 Flood Meteorological offices to Central Water Commission.

MAP OF FLOOD METEOROLOGICAL OFFICES

LEGEND

RIVER / TRIBUTARY

AREA UNDER FMO

CENTRAL WATER COMMISSION IS FRAMING FLOOD WARNINGS USING QPF AND FLOOD FORCASTING MODELS

MIKE II, TANK, NWSH, HBV, NAM, SSARR etc

AND ISSUES SAME TO STATE GOVERNMENTS.

The flood warning is provided for 157 flood prone cities.

THE CHALLENGES in FLOOD FORECASTING

- Initial rainfall runoff models were of lumped type and the input is to average areal rainfall of catchment, which is relatively easy to forecast.

- The recent models are distributive type. They require the rainfall input (forecast) at point.

- Further the lead time of forecast is demanded as 48 hrs or more for shorter durations like 6 hrs.

- The **underestimation** of stage / discharge results into unexpected inundation while overestimation results into unnecessary displacement which is not taken kindly by the society.

- The representative public reaction to the overestimation of flood risk is illustrated as

"FINE WEATHERMAN FOR BAD FORECAST"
- SERGEI SHOIGU –RUSSIAN MINISTER

HINDUSTAN TIMES -26 APRIAL 04

SHOIGU , EMERGENCY MINISTER (Russia) , IN IRKUTSK WHILE SPEAKING ON FLOOD ALERT SAID THAT HE WANTED WEATHERMAN TO PAY THE PRICE FOR GETTING FORECAST WRONG BECAUSE IT LED TO EMERGENCY SERVICES BEING NEEDLESSLY CALLED OUT.

Proposal on FLOOD FORECASTING (METEOROLOGICAL COMPONENT)

The project is implemented with technical assistant of United States

- P.I. : Dr. (Mrs.) Surinder Kaur, IMD
- CO- P.I. : Parvinder Maini, NCMRWF

OBJECTIVE

IMPROVEMENT IN RAINFALL ESTIMATION AND PREDICTION BY USING NWP MODEL OUTPUTS AND OTHER TECHNIQUES, WITH A PILOT PROJECT FOR THE MAHANADI RIVER BASIN

DATA POSITION

- **Mahanadi river traversing length of 851 km and has catchment area of 141600 sq km.**

- **Mahanadi river catchment has 15 Climatological Stations and 25 raingauge stations the data of which is received in real times. IMD is planning to add satellite linked ARG s in the catchment.**

- **Central Water Commission is maintaining 34 Gauging sites in the catchment.**

MAHANADI BASIN

AREA=1,41,600 Km²
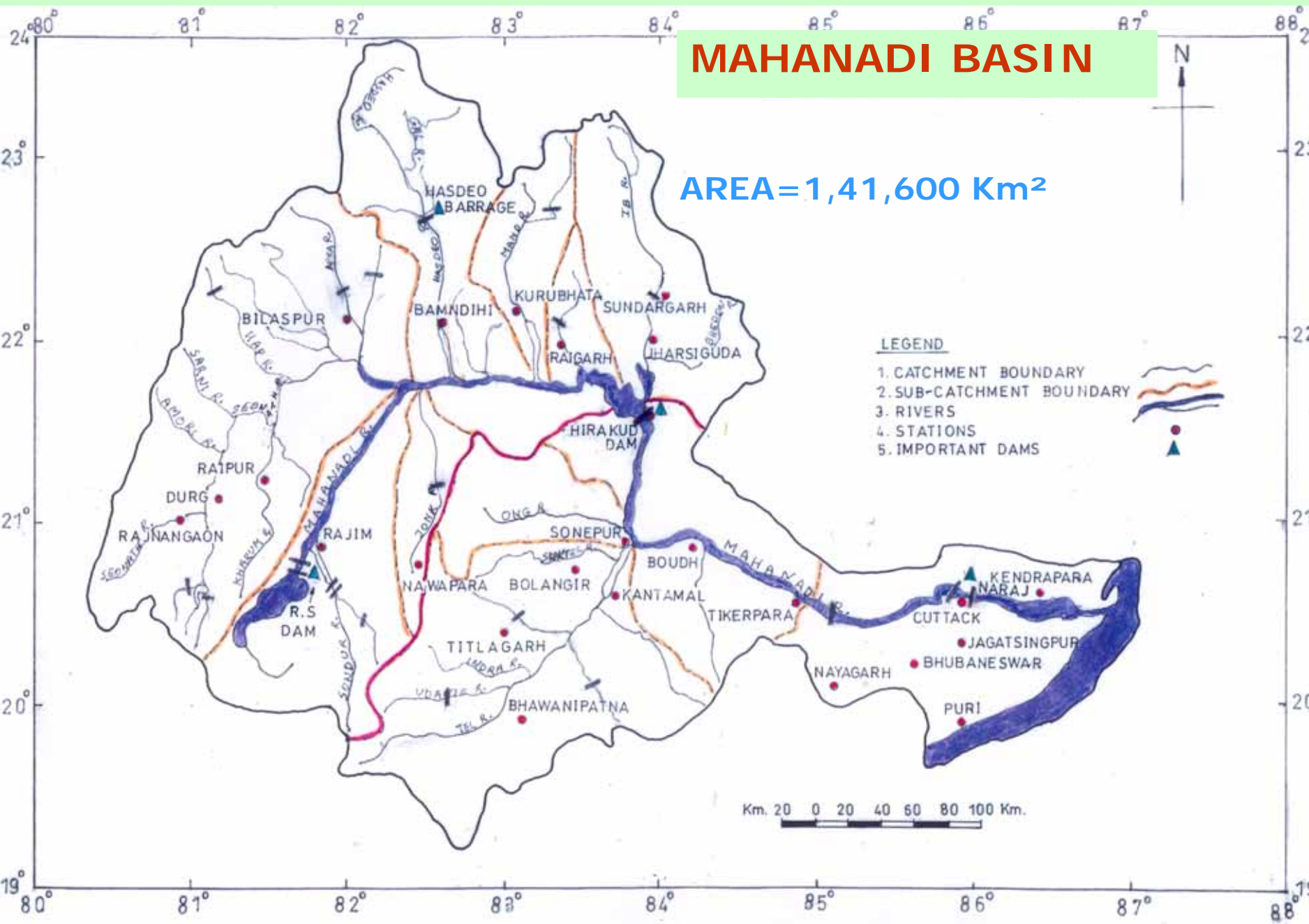
MAJOR THEMES

- PRECIPITATION DOWN SCALING TECHNIQUE
- LOCATION SPECIFIC FORECAST
- BASIN PRECIPITATION FORECAST

DELIVERABLES

- ENHANCED METEOROLOGICAL OBSERVATIONAL NETWORKS IN MAHANADI RIVER BASIN.

- LOCATION SPECIFIC PRECIPITATION FORECAST FOR 24 HRS/48 HRS

- **ENHANCEMENT IN FORECAST PERIOD FROM 24 HRS TO 48 HRS**

- **ESTIMATION OF SUBCATCHMENT WISE PRECIPITATION FORECAST FOR 24 HRS/48 HRS USING GIS TECHNIQUES.**

FOLLOW UP ACTION

WORK IN PROGRESS FOR MAHANADI BASIN :

DEVELOPMENT OF FORECAST MODEL (MOS) FOR QUANTITATIVE PRECIPITATION FORECAST (QPF)

ESTIMATION OF BASINWISE QUANTITATIVE PRECIPITATION FORECAST FOR DIFFERENT SUBCATCHMENTS

- **VALIDATION OF MODEL**

  DEVELOPMENT OF PRECIPITATION FORECAST MODEL FOR OTHER FLOOD PRONE RIVER BASINS OF INDIA.

One Scientist is trained in

" Precipitation Estimation - Down Scaling Techniques"

One Scientist is to be trained in

" Estimation of basin precipitation using GIS Techniques."

DEVELOPMENT OF MOS FOR QUANTITATIVE PRECIPITATION FORECAST (QPF) IN RESPECT OF MAHANADI RIVER BASIN

INPUT

- NWP MODEL OUTPUT (LAM, MM-5) AT GRID POINT
- ACTUAL RAINFALL DATA AT STATIONS
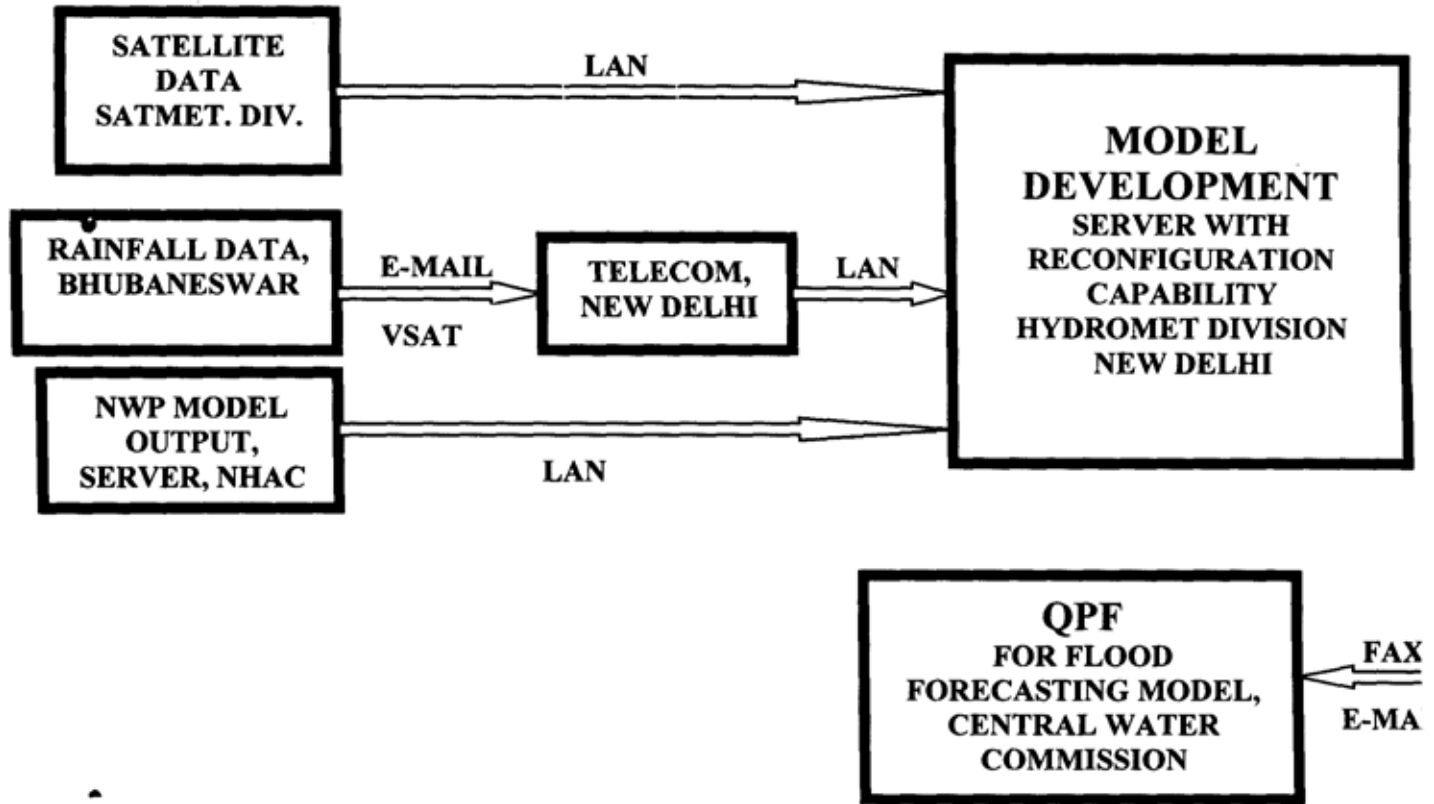- CATCHMENT CHARACTERISTICS – HEIGHT ETC
- SATELLITE DATA

DEVELOPMENT OF MOS FOR QPF USING HIGH POWER COMPUTER (SERVER) WITH RECONFIGARATION CAPABILITY

OUTPUT

RAINFALL FORECAST (24 HR & 48 HR) (QPF & POP)
- (i). SELECTED STATIONS
- (ii). GRID POINTS

DISSEMINATION OF SUB-BASIN WISE QPF OF MAHANADI TO FMO, BHUBANESWAR VIA HIGH-SPEED COMMUNICATION SYSTEM FOR OPERATIONAL USE

CONCEPTUAL BLOCK DIAGRAM FOR COMMUNICATION NETWORK

THANK YOU