EXPERIENCES WITH SPACE TECHNOLOGY IN MANAGEMENT OF 2008 FLOOD ADVERSITY IN DRY RIVER DELTA IN CENTRAL NORTHERN NAMIBIA

Guido Van Langenhove, Pauline Mufeti

Hydrological Services Namibia

UN-SPIDER Workshop "Disaster Management and Space Technology – Bridging the Gap", Bonn, Germany, 13-15 October 2008

SPACE TECHNOLOGY AND 2008 FLOODS IN NAMIBIA

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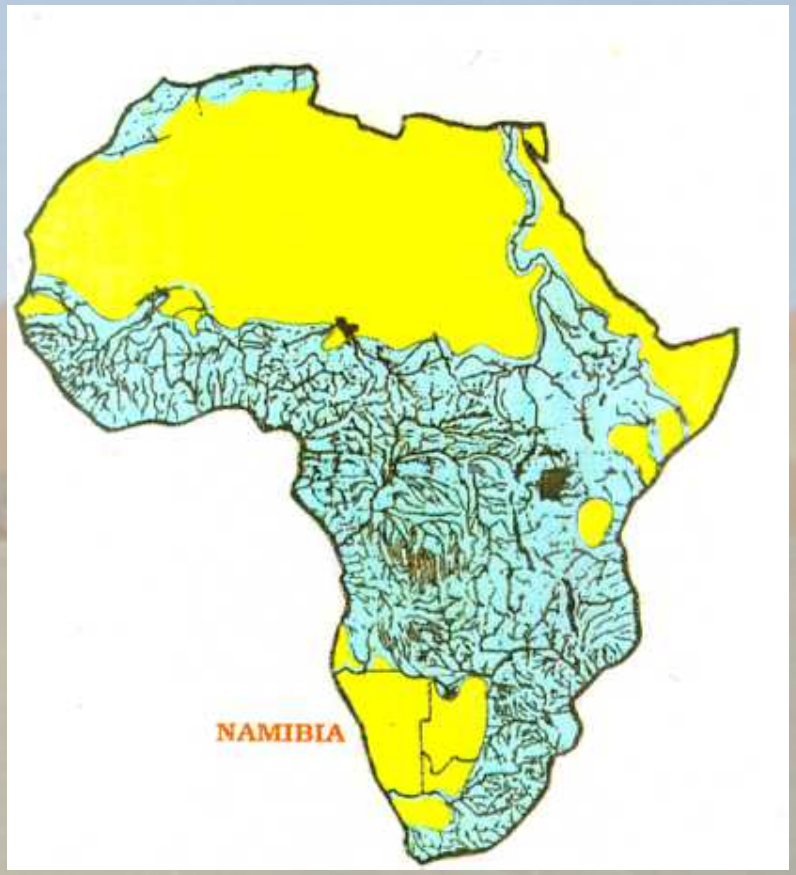

SPACE TECHNOLOGY AND 2008 FLOODS IN NAMIBIA

SPACE TECHNOLOGY AND 2008 FLOODS IN NAMIBIA

- Population = 2.008 million
- Land Area = 0.824 million km²
- Population Density = 2.4 persons/km²
- GDP in 2001 = NS$ 52,527 million
- (EUR 4,500 million)
- Per capita GDP = EUR 2.250
- Irrigable Land = 4.0 million ha
  - » < 5 % of area
- Main employer : agriculture
- Important economic sectors :
  - » Mining (diamonds, uranium)
  - » Tourism
  - » Fishing

SPACE TECHNOLOGY AND 2008 FLOODS IN NAMIBIA

- Disasters – hydrometeorological extremes
  - Droughts
  - Floods
- Floods in ephemeral rivers in interior
  - Flash floods - erratic
- Floods in perennial rivers on borders
  - Seasonal floods
  - Timing, magnitude, duration unpredictable

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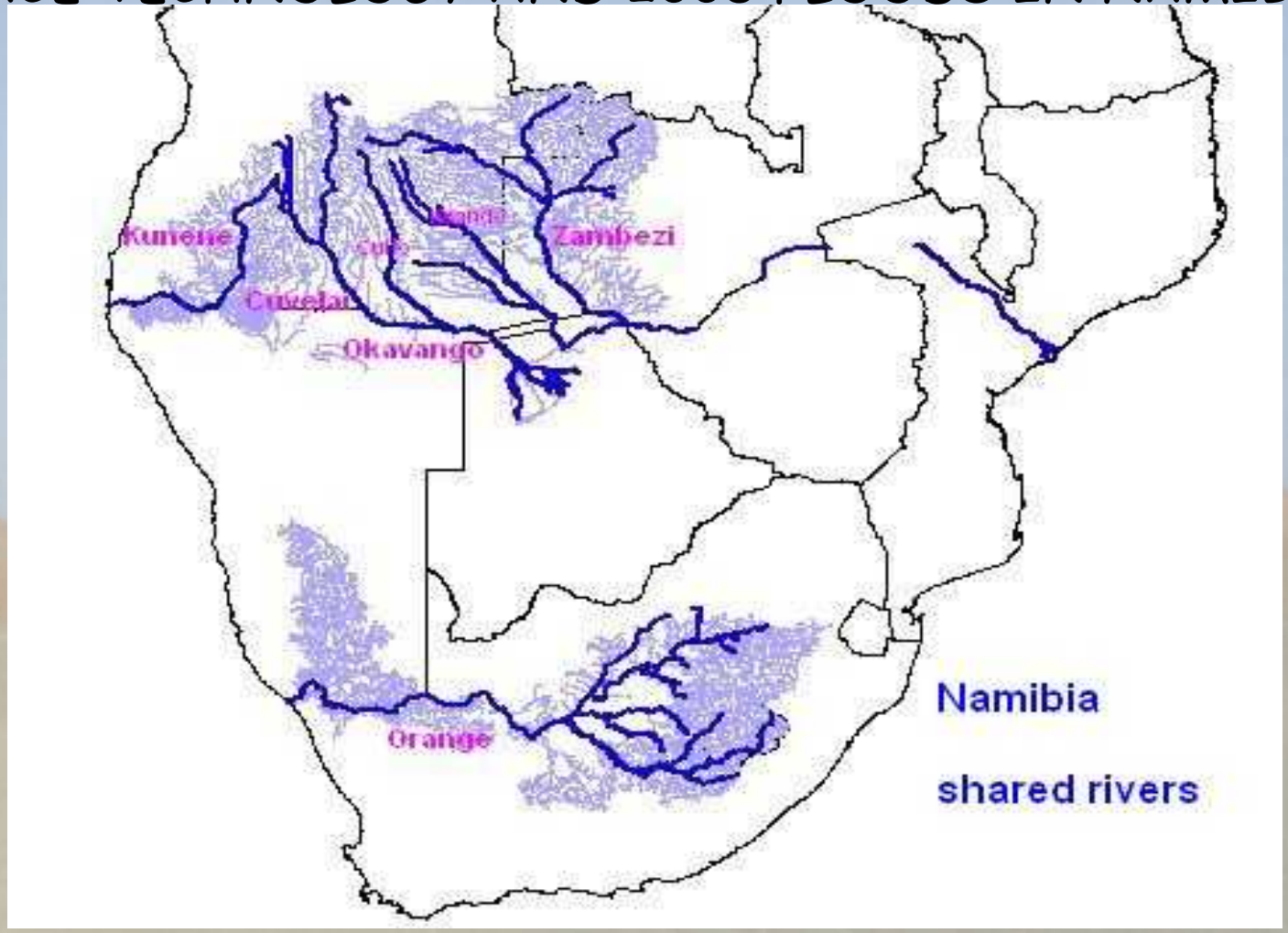

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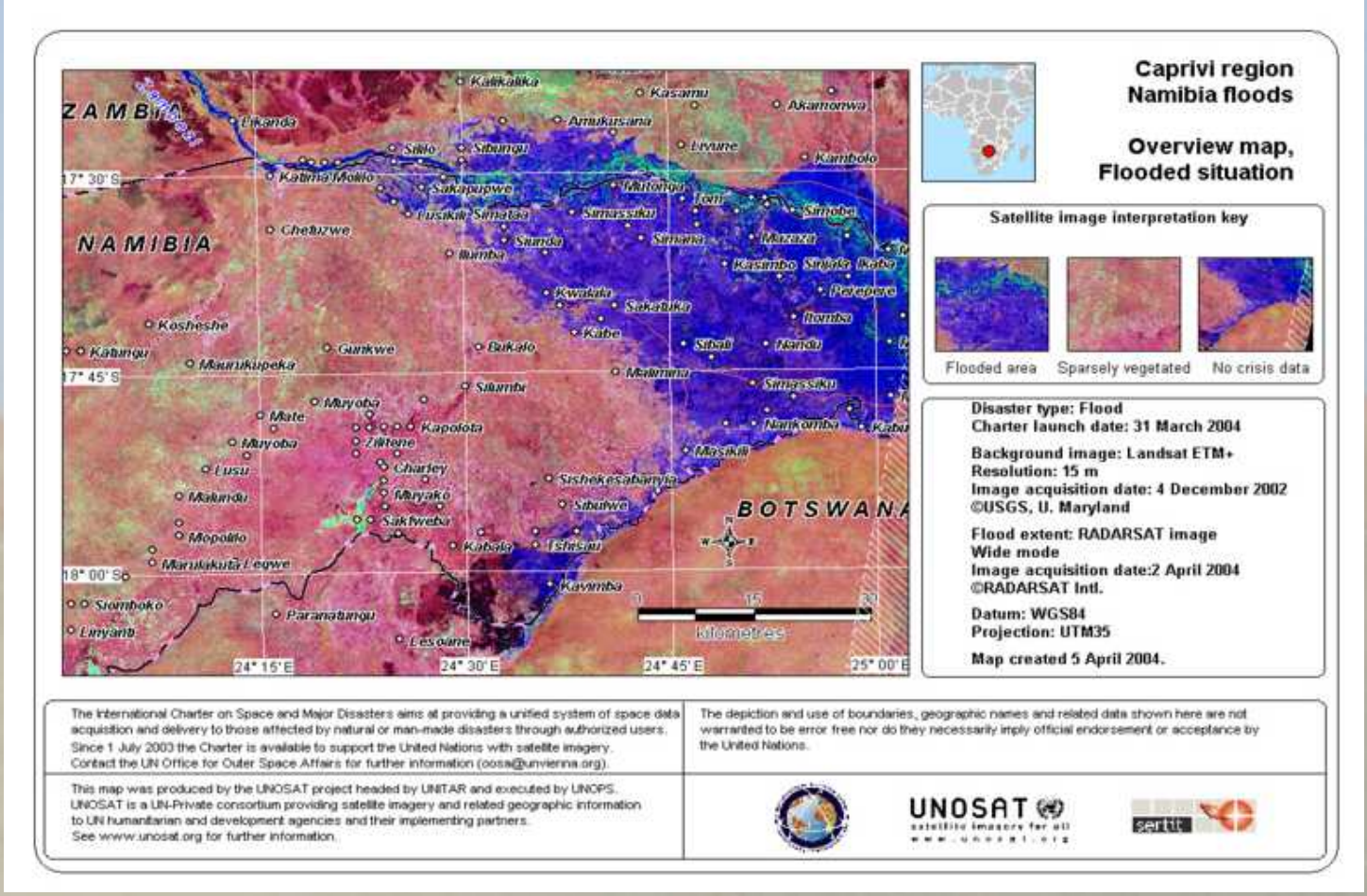

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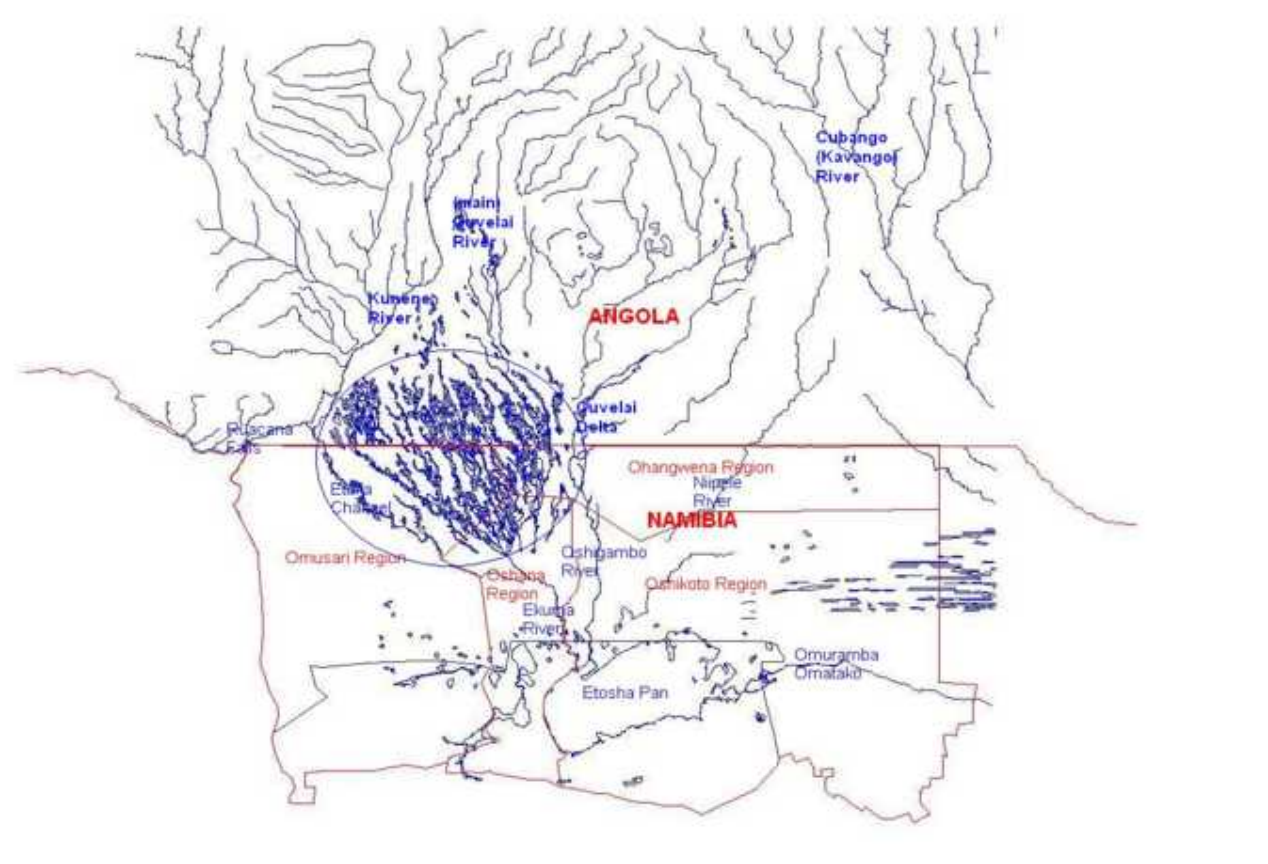

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Cuvelai drainage system – ill-defined

- Very flat area
- Topographical mapping (elevations) limited
- Normally dry
- Good rainy seasons: water fills interlinked depressions and flow in some "channels"
- Large catchment, upper part in Angola
- No recent major floods
- No measured records and virtually no documentation of historic floods (1970s)

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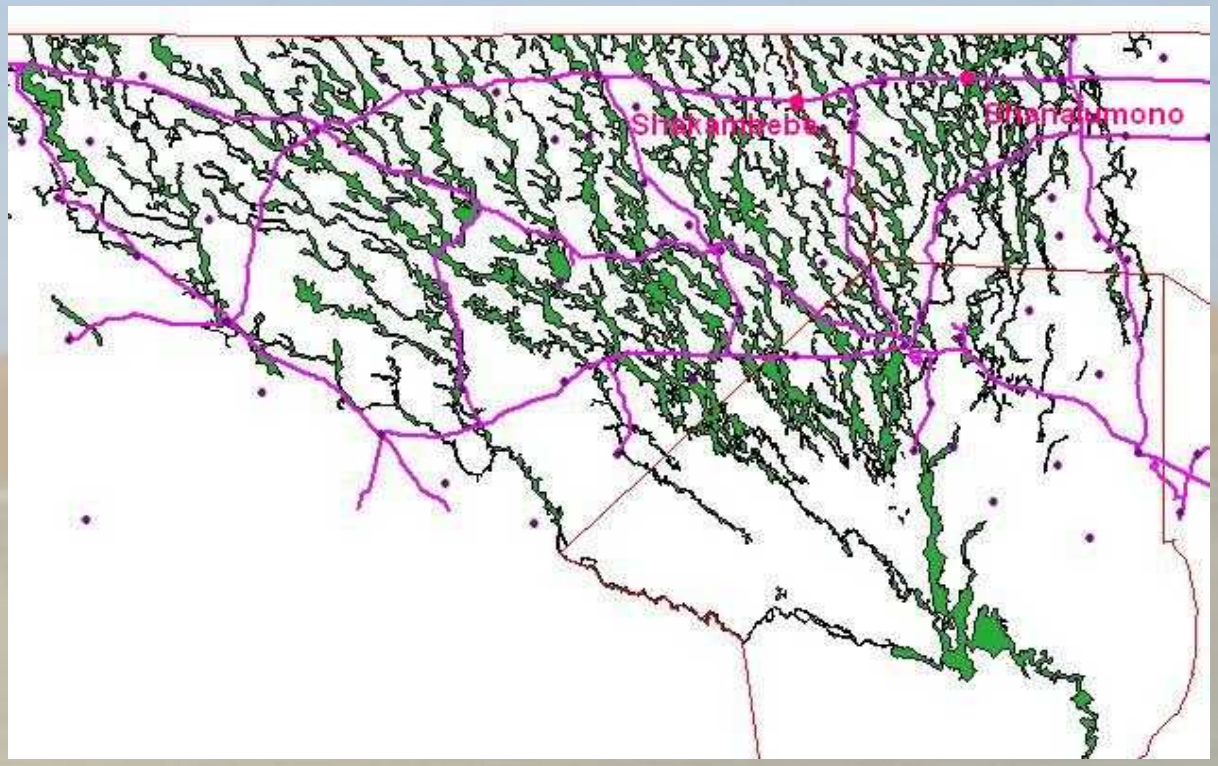

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2008 floods in Cuvelai - hydrology

- Heavy rains from mid-January
- 2 months of continuous flooding
- Estimated return period: 20 years
- Features:
  - Duration
  - Succession of waves with increasing magnitude and impact

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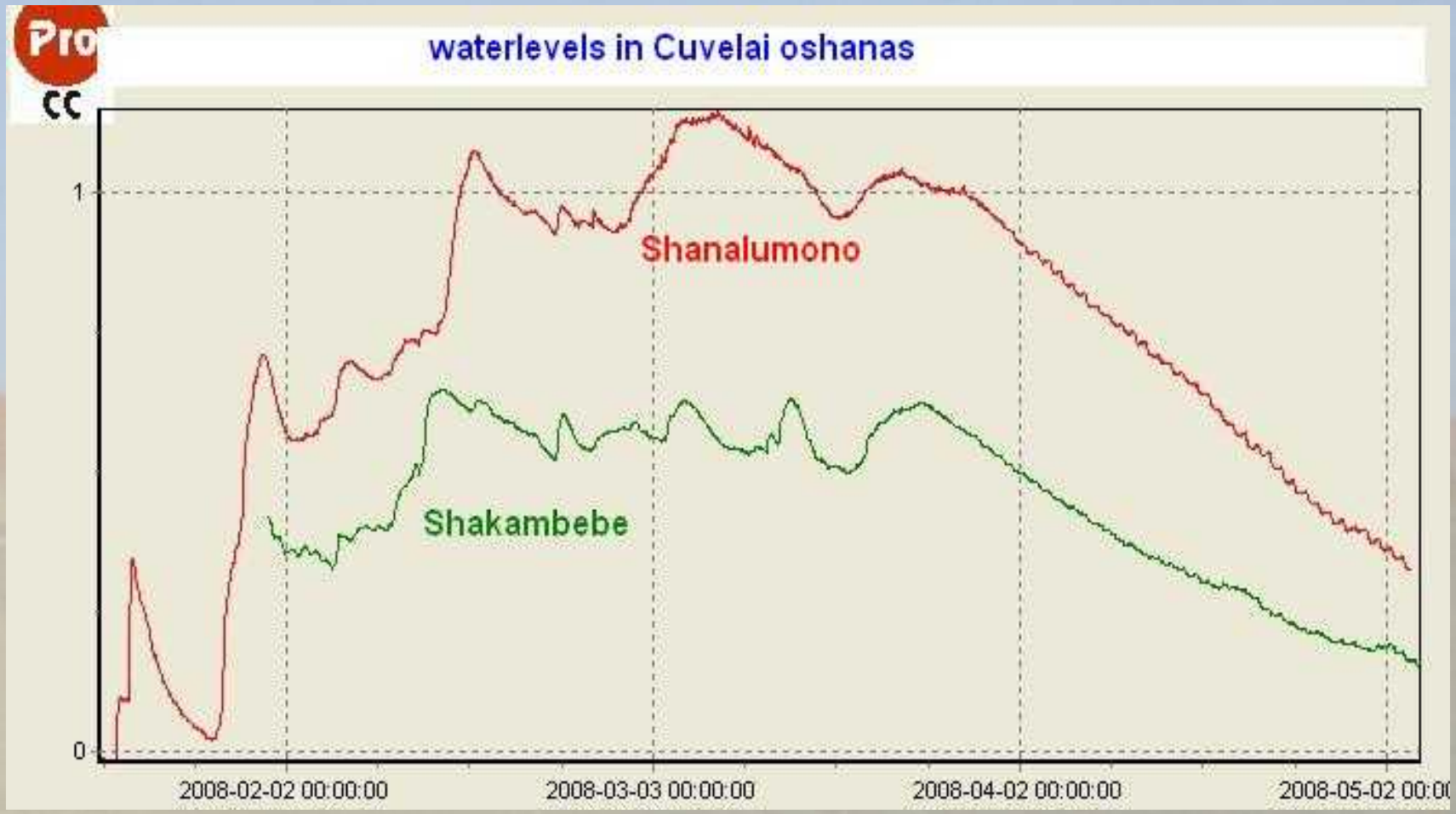

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2008 floods in Cuvelai – disaster

- Inundation of informal settlements in urban areas
- Evacuation of people in improvised camps
- Agricultural areas under water for too long time
- Disruption of infrastructure (roads)
- No access to medical services, schools, social services
- Disruption of water supply and sanitation
- Health hazards and waterborne diseases (malaria, cholera)

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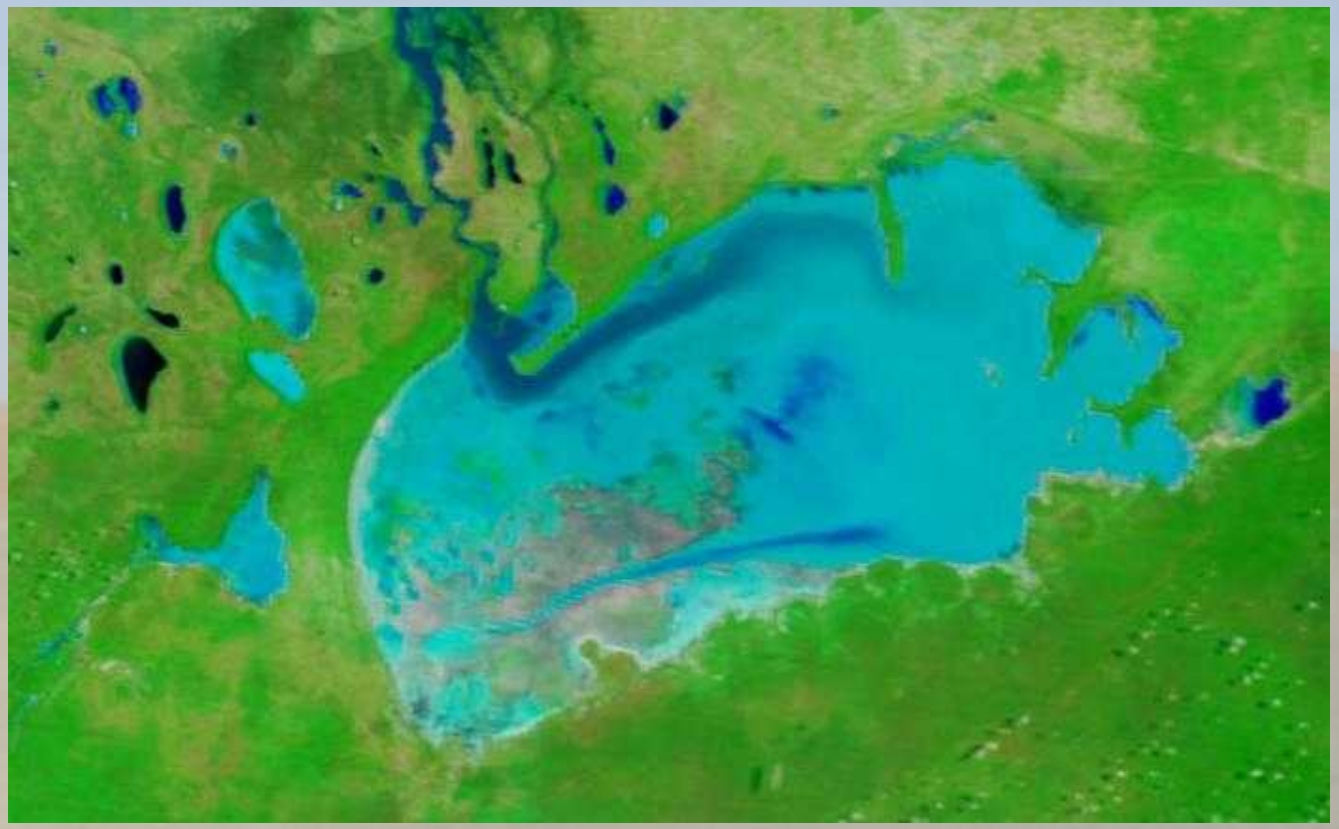

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- Application of space technology – acquisition and processing of satellite images – not pursued
  - Expertise with optical (LandSat) images useless (resolution, acquisition, weather)
  - Channels for alternative products virtually unknown
  - InterNet access too slow
  - Capabilities for processing and for usable products would have been inadequate

SPACE TECHNOLOGY AND 2008 FLOODS IN NAMIBIA

- Application of space technology – invoked external assistance – successful
  - Previous experience with CSA project (RadarSat images) under TIGER programme
  - Activation of "Charter On Cooperation To Achieve The Coordinated Use Of Space Facilities In The Event Of Natural Or Technological Disasters" – implemented by UNOSAT
  - Assistance of DLR/ZKI, UNOSAT, USAID/FDA

SPACE TECHNOLOGY AND 2008 FLOODS IN NAMIBIA

Pleasant/unexpected surprise

- Wide range of products (Terrasar, PALSAR, RadarSat, ASAR, DMC, SPOT5)
- Large area covered (including Angola)
- Adequate resolution (10 m required)
- Rapid availability of usable products – maps
- Flood masks/vectors
- Independent ground validation showed good accuracy in difficult areas

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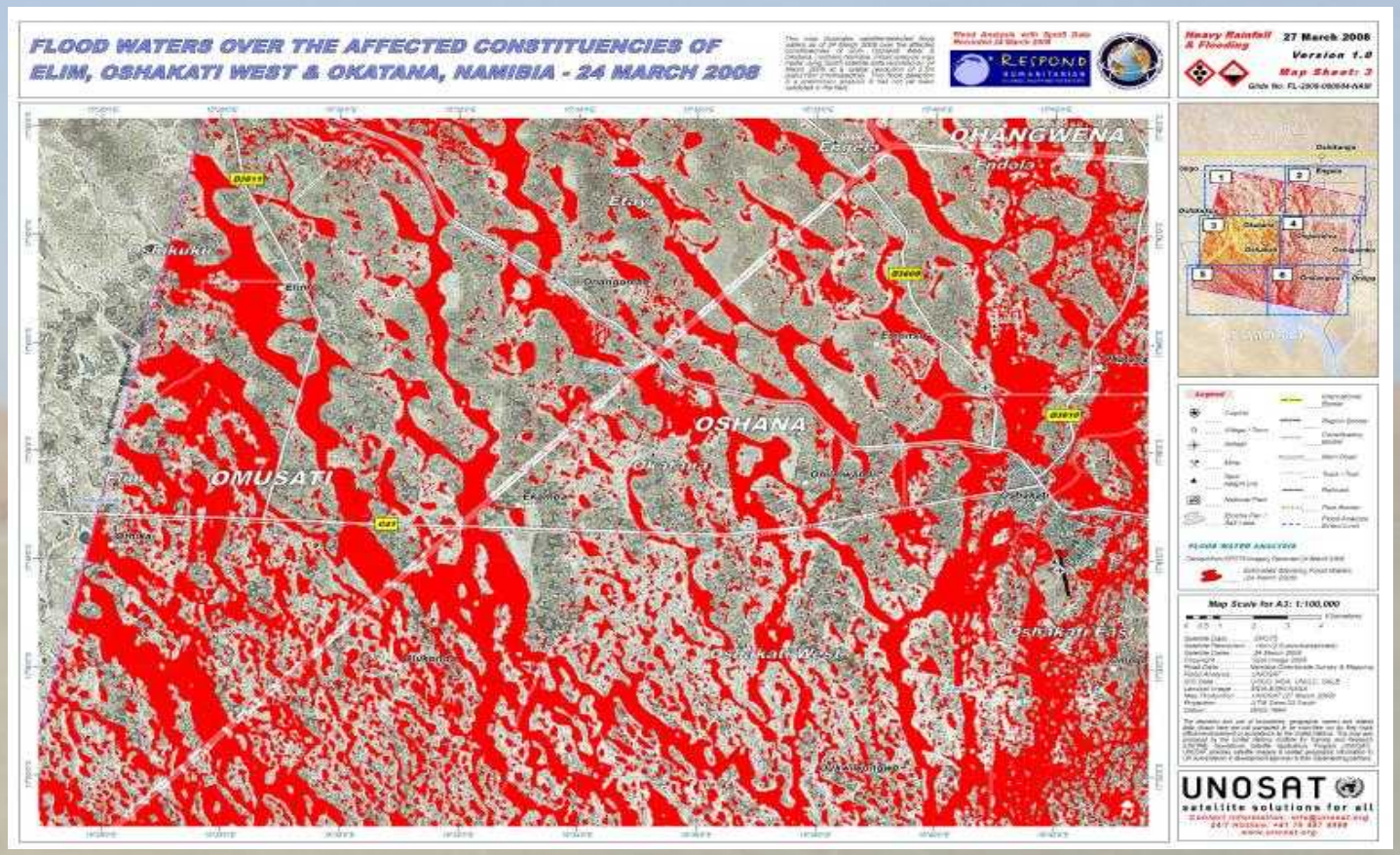

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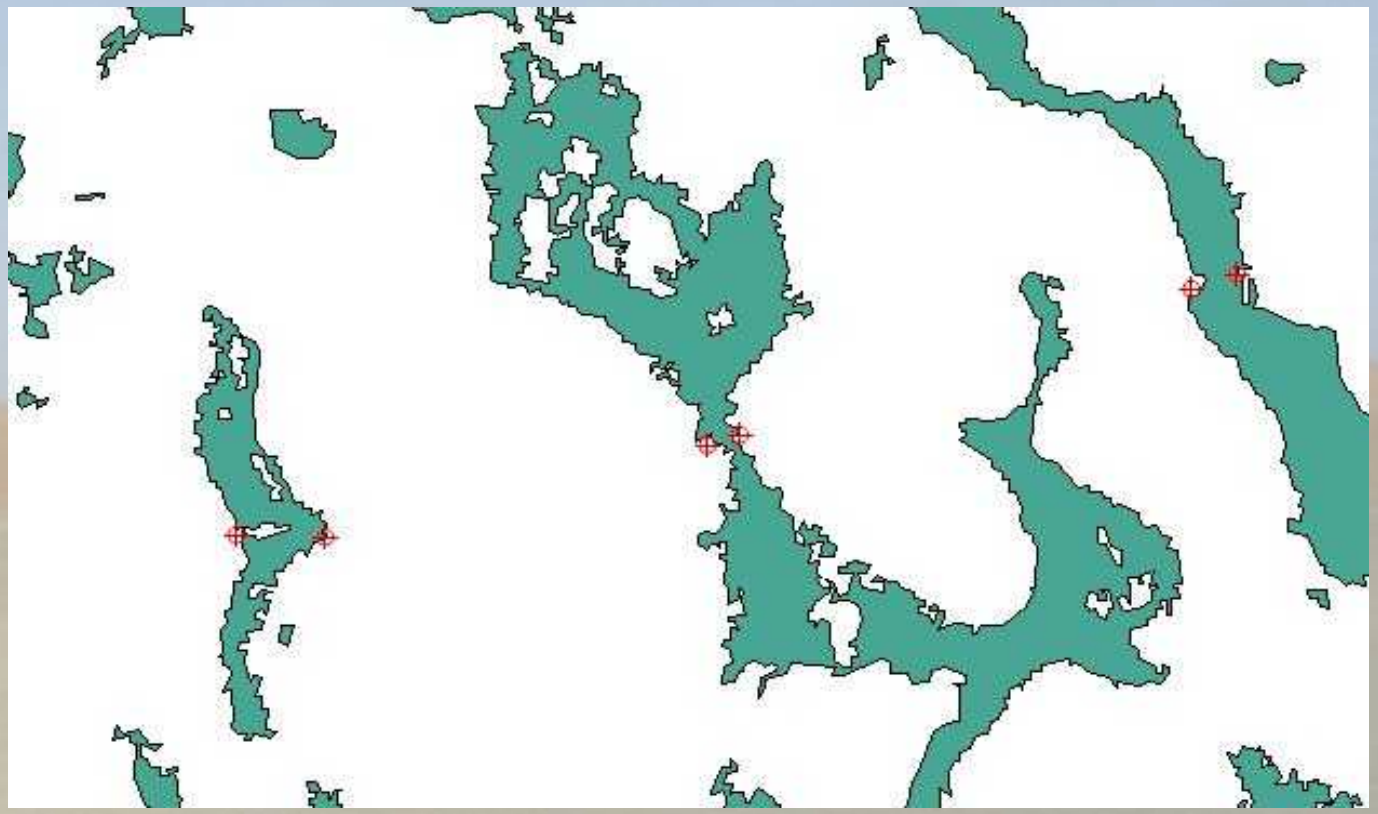

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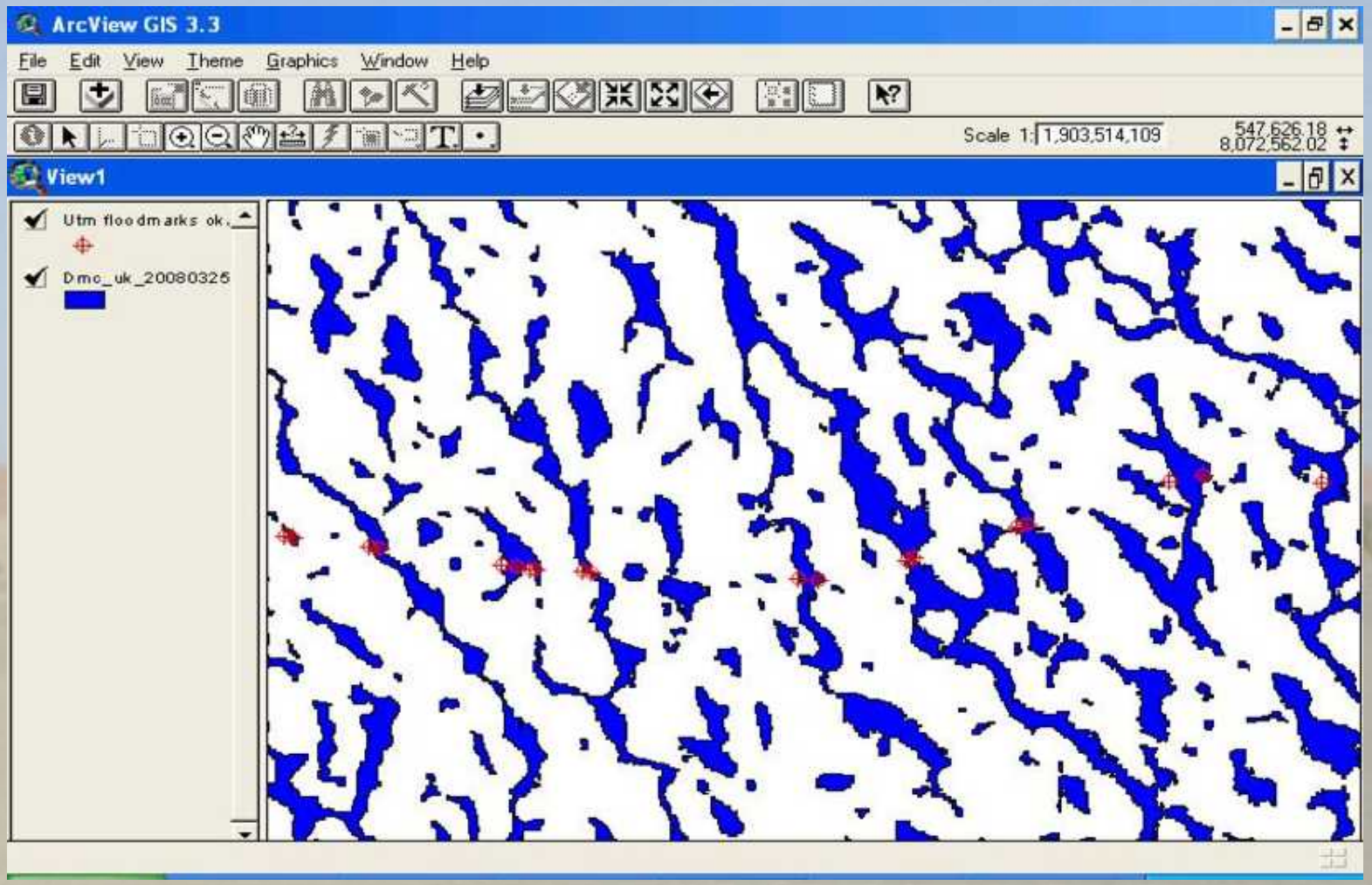

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Benefits – much improved hydrological understanding

- Channel systems
- Relation with upstream rainfall patterns
- Links with other river systems
- Upstream information from Angola
- Confirmed denial of false rumours (dam breaks, river diversions)

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- Benefits - maps for wide range of people
  - Decision makers - Cabinet
  - Newspapers
  - Availability on websites
- Public awareness of magnitude of disaster
  - Accuracy of mapping secondary to timing

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Donderdag 27 Maart 2008

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Malaria in wêreldvisier

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Benefits - operational decisions

- Distribution to disaster management organizations
- Evacuations – areas and periods
- Road access impossible – bringing in helicopters and boats for emergency supplies and evacuations

Effective operational use limited in relation to potential use

- Capacity issue

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Benefits for future planning

- Hydrological monitoring network and strategy
- Urban floodzoning - settlements
- Rural land use planning
- Infrastructure planning (roads, water supply)
- Required extent for aerial lidar surveys
- Investigation of hydraulic measures (channel diversions, protection dykes)

Planning use higher than operational use

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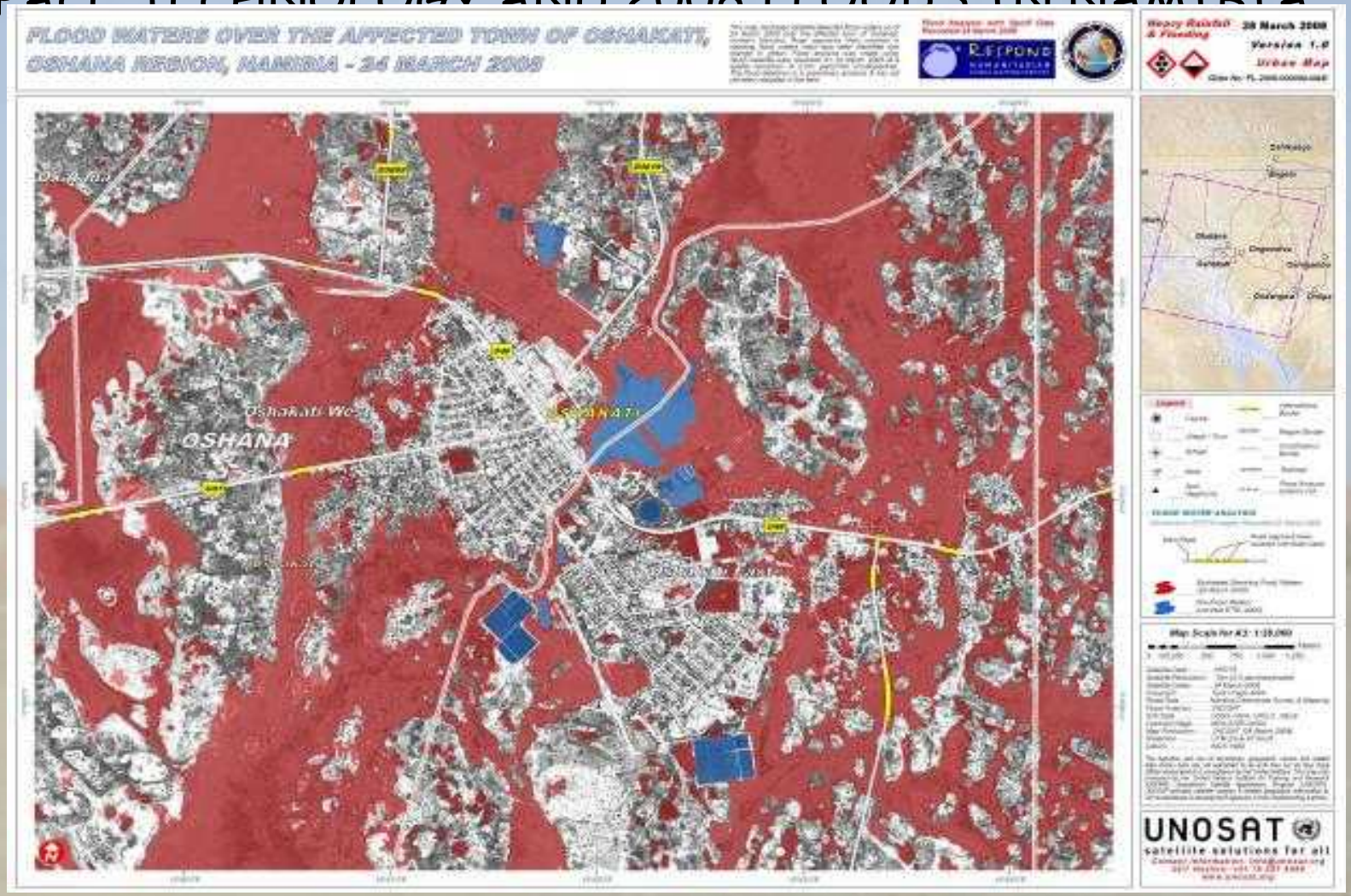

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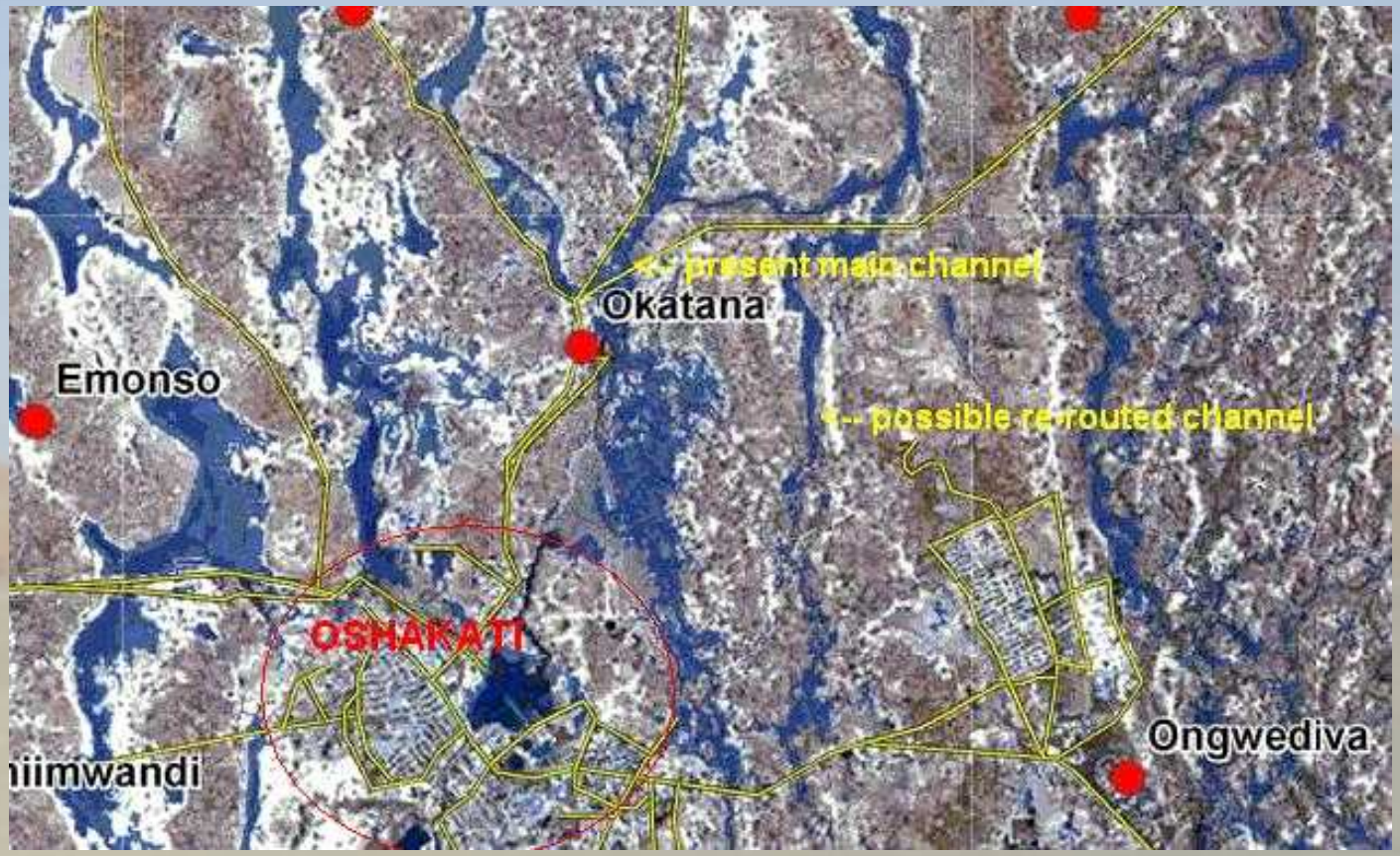

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Experienced setbacks for operational use

- Uncertainty what would be available
- Time delays with charter activation
  - Procedures were unknown
  - Delays with official declaration of emergency
  - UN system procedures
  - Poor initial communication with PM
- Users not acquainted with interpretation and use
- Incorporation of other strategic spatial information – schools, health centers

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Lessons learnt - required

- Development of internal capacity
  - Ready knowledge of relevant products
  - Rapid acquisition procedures,
  - Processing capabilities
- Development of capacity of disaster management organizations
  - Interpretation and use of products
- Alert readiness for external support
  - Partners
  - Arrangements

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Project proposal

- OBJECTIVE
  - Mitigation of impacts of flooding in flood prone areas in northern Namibia
- OUTCOMES
  - Access to near-real-time flood mapping
  - Availability of floodzone mapping