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# BioRA DSS Workshop

## Preliminary Reference Scenario

**BioRA DSS Technical Workshop**
**Phnom Penh, Cambodia**
**15-19 February 2016**

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# BACKGROUND



## Reference data sets

DRIFT uses the reference data sets to:

- Determine seasonal thresholds with which to delineate seasons for all scenarios.
- Provide the range for the values for the X-axes for the construction of response curves for the DRIFT indicators.
- Provide a reference from which to predict relative ecosystem change.

# Type of reference data required

- Data required
  - Hydrology
  - Hydraulics
  - Water quality
  - Sediments
- Daily (or sub-daily) time-series data, linked to hydrology
- All Focus Areas
- River and floodplain – as applicable
- Must cover the same temporal period (e.g., 1985 – 2008)



- Preliminary reference data were used for preliminary calibration and were from three data sources:
  - Hydrology/hydraulic data from DSF/WUP-FIN model outputs for 1985-2008
  - Sediment and water quality monitoring data
  - Calculated

- Preliminary reference data were used to provide indicative ranges of parameters to allow preliminary calibration of the BioRA DSS

- Final calibration will be conducted using reference data from DSF/WUP-FIN model outputs for hydrology, hydraulics, sediment, and water quality

- Note that 'testing' is part of the calibration process

# Preliminary Reference Scenario

- Modelled hydrology:
  - 1985-2008 climate (rainfall) data
  - 2007 level of infrastructure development
  - 2003 level of landuse
  - a daily time-series
- Measured WQ and sediments



# Computing BioRA indicators

- The DSS has a number of internal routines that calculate the BioRA indicators from the hydrology, hydraulic, WQ and sediment time series data

# PRELIMINARY REFERENCE: HYDROLOGICAL DATA



# Hydrological indictators

| All | Mean annual runoff |
|---|---|
| Dry season | Onset |
| | Duration |
| | Minimum 5-day discharge |
| | Average daily volume |
| | Within-day range in discharge |
| Transition season 1 | Average daily volume |
| | Maximum instantaneous discharge |
| | Maximum rate of change in discharge |
| | Within-day range in discharge |
| Wet/flood season | Onset |
| | Duration |
| | Maximum 5-day discharge |
| | Average daily volume |
| | Flood volume |
| | Within-day range in discharge |
| Transition season 2 | Average daily volume |
| | Within-day range in discharge |

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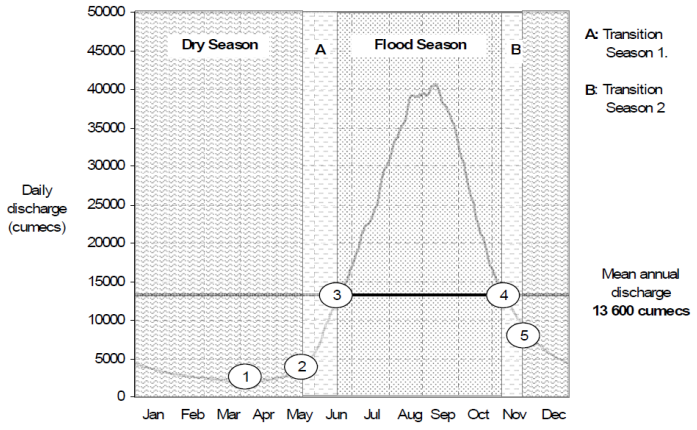
# Generation of hydrological indicators

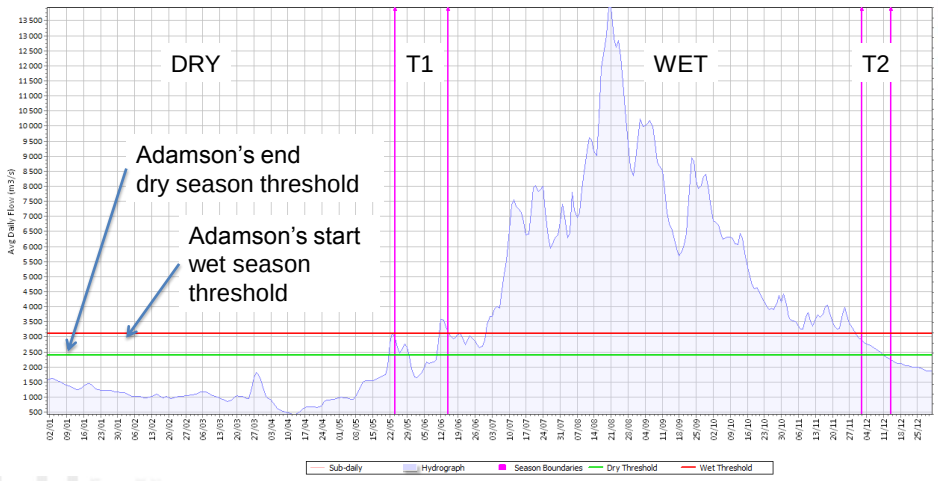
- DSS divides **each hydrological year** into seasons based on flow thresholds:
    1. Dry season
    2. Transition season 1
    3. Flood season
    4. Transition season 2
- Generates a time-series of annual values for each indicator



# Definition of seasons (Adamson 2004)

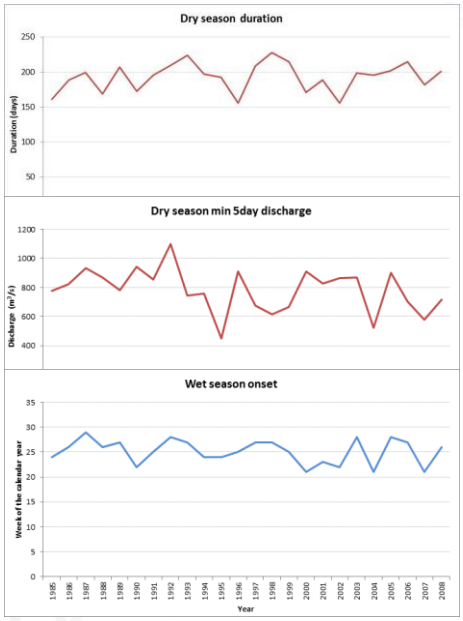


# Analysis of flow time-series






# Analysis of flow time-series

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## PRELIMINARY REFERENCE: HYDRAULIC DATA

# Hydraulic data

- 1985-2008 – linked to hydrology
- Supplied by IKMP using DSF ISIS-ID model and WUP-FIN 3D-EIA model
  - 1 dimensional ISIS (ISIS-ID) model was used for all channel hydraulics at FA1 – 3, and 5:
    - mean water stage and depth
    - mean water velocity in the channel
    - mean wetted perimeter
- Calculated:
  - shear stress



# Hydraulic data - continued

- For the floodplains associated with FA3, FA5 and FA7, WUP-FIN 3D-EIA model was used:
  - Flooded area
  - Average depth
  - Maximum depth
  - Average velocity

# Hydraulic indicators

- DSS uses the **hydrological** seasons:
  1. Dry season
  2. Transition season 1
  3. Flood season
  4. Transition season 2
- Calculates:
  - Mean
  - Min
  - Max
  - Variations
- Generates a time-series values for each indicator for each season



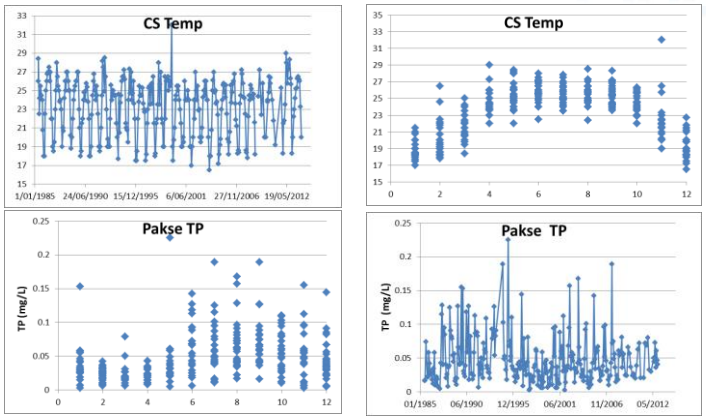
## PRELIMINARY REFERENCE: WQ AND SEDIMENT DATA

# WQ and sediment data

- Calibration of the DSF for these parameters is still in progress, so preliminary reference time-series were based on monitoring data:
  - Water quality: derived using the results from the Water Quality Monitoring Network (WQMN) for the period 198 – 2008.
  - Suspended sediments: rating curves constructed relating discharge to the TSS data from WQMN or historic depth integrated suspended sediment sample data.



# Examples of WQMN Results




- Time series & monthly trends available for WQMN parameters for representative site in each FA
- WQMN results include temporal changes

# Sediment and WQ indicators

- DSS uses the **hydrological** seasons:
  1. Dry season
  2. Transition season 1
  3. Flood season
  4. Transition season 2
- Calculates:
  - Mean
  - Min
  - Max
  - Variations
- Generates a time-series of **seasonal** values for each indicator



# IN SUMMARY

# Summary

- The preliminary hydrology and hydraulic reference data were supplied by IKMP.
- The preliminary reference scenario is defined by:
  - 1985-2008 climate (rainfall) data;
  - 2007 level of infrastructure development;
  - 2003 level of landuse;
- Sediments and WQ data entered into the DSS are measured, not modelled.
- No modelled data were available for FA4, FA6 or FA8 so these are not yet populated in the DSS



## Calibration is not complete

*The BioRA DSS is ready for testing and training, and will undergo additional calibration:*

- *On the basis of the results of this workshop*
- *Once the full suite of reference hydrological, hydraulic, sediment and water quality data are available*

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# Thank You

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