DSF: KEY MODELS AND CAPABILITIES

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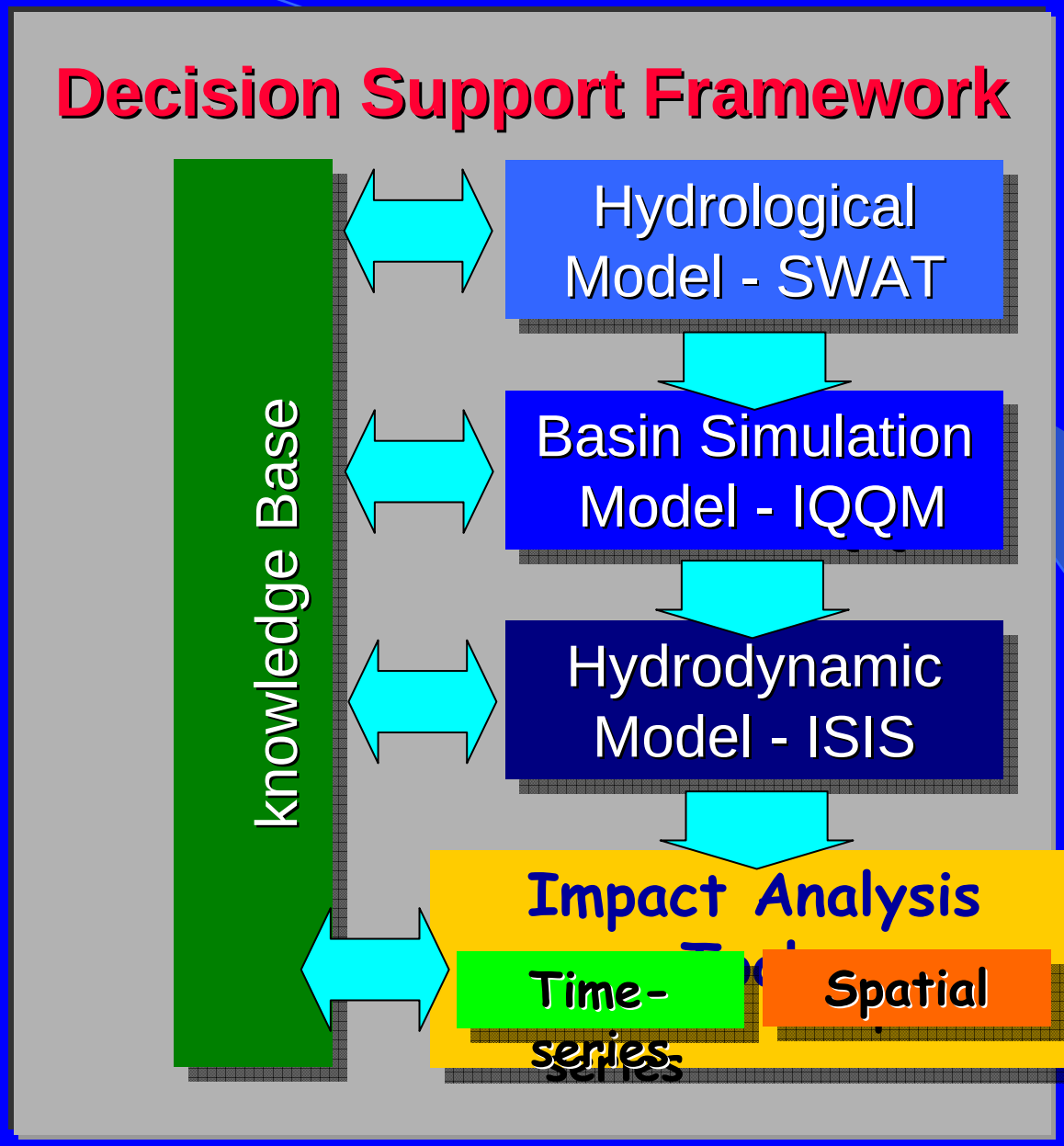
What is DSF?

- DSF is a modelling system consisting of a database, models and analysis tools working through a common interface
- All models and many tools can be used independently
- DSF is a toolbox from where we can choose the best option to solve a problem
- Installed in all 4 MRC countries

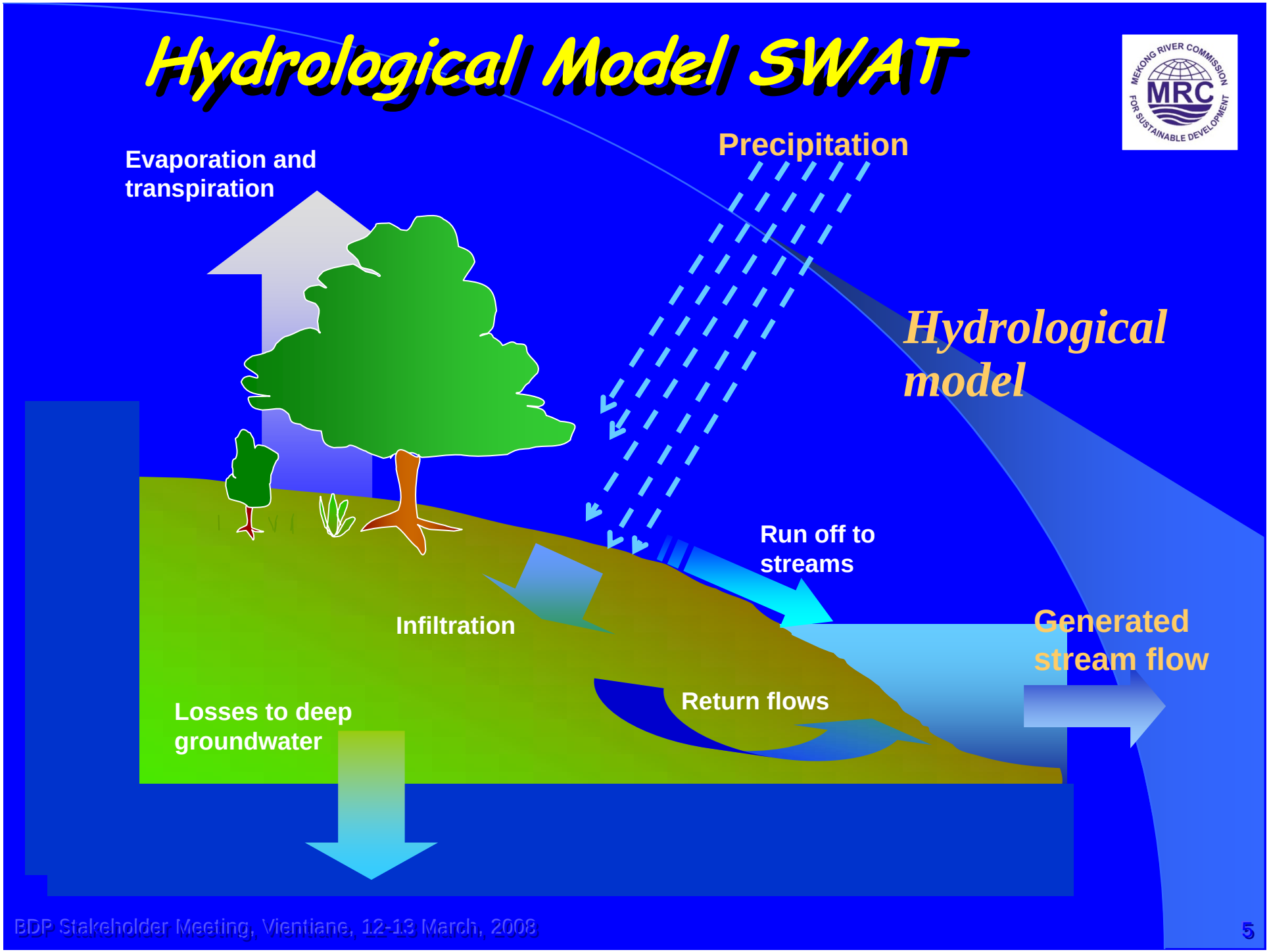
Decision Support Framework



SWAT (Soil and Water Assessment Tool)

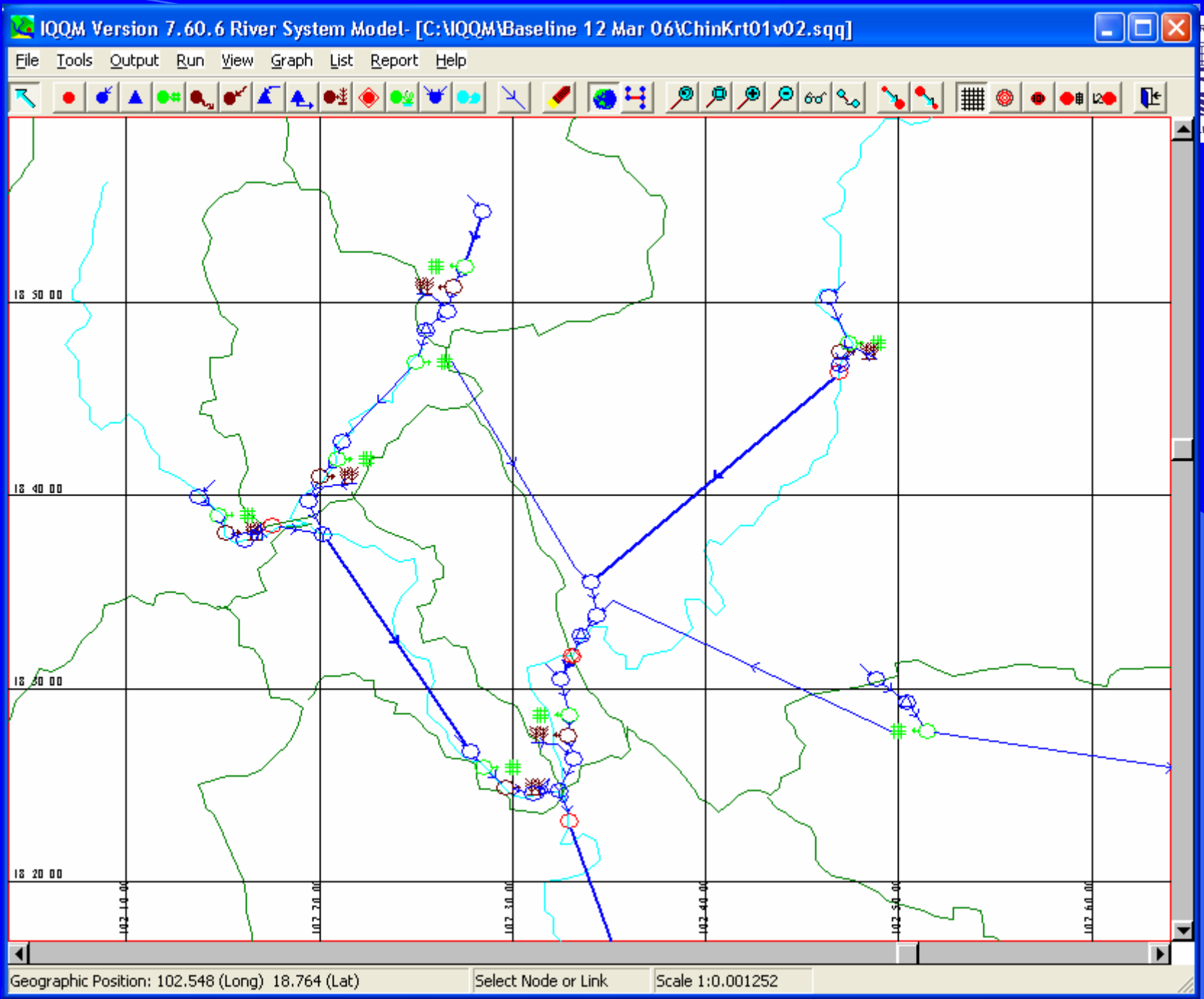
- Hydrological model developed at Texas University, US
- Main output: flow at outlet of each subbasin
- Uses rainfall, temperature + other meteorological data as driving force to produce runoff from catchment
- Landuse, soil type has to be defined
- >500 subbasins in Mekong model

Hydrological Model SWAT



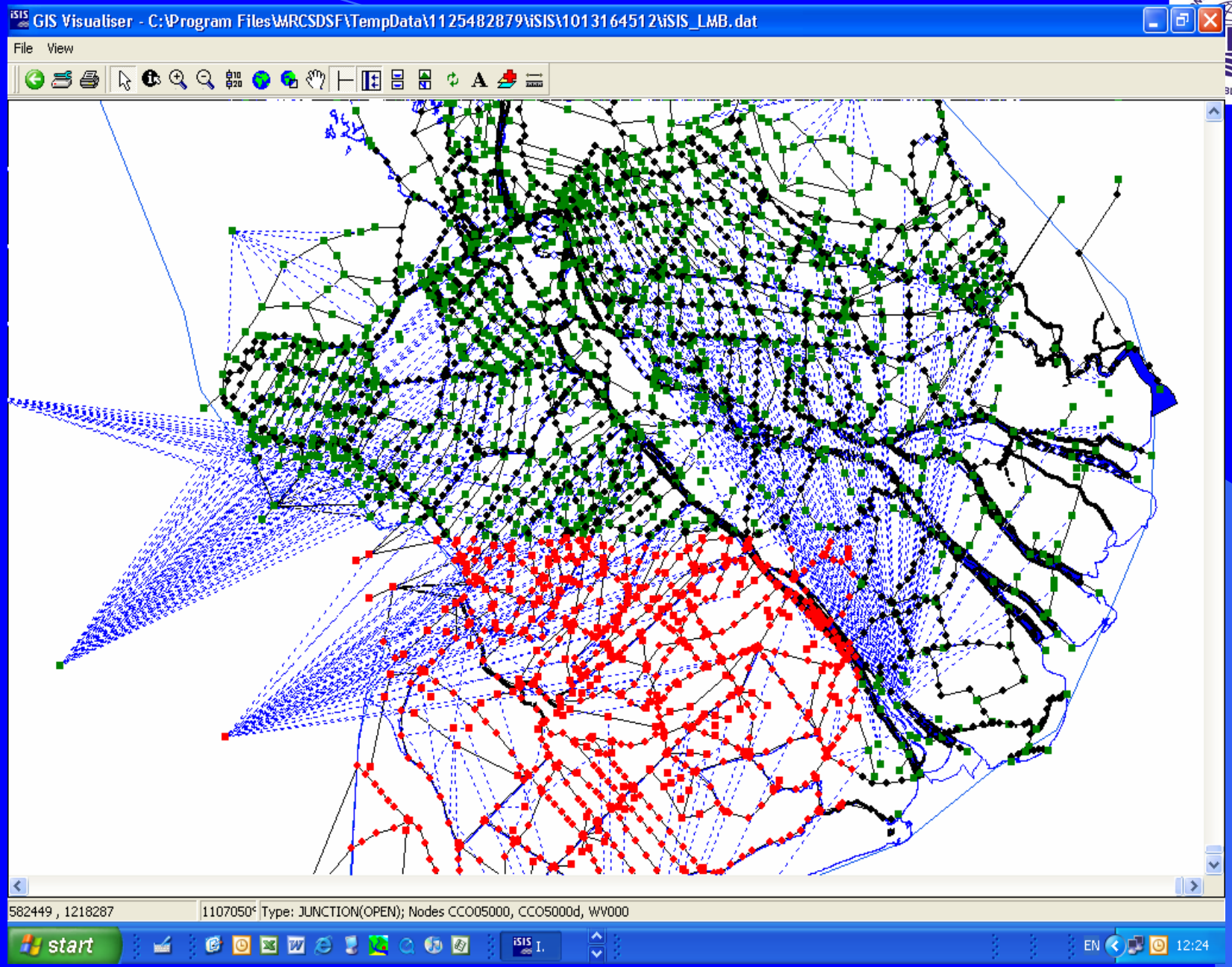
IQQM (Integrated Quantity and Quality Model)

- Water resource management model developed by DLWC, Australia
- Uses flow input from SWAT
- Water demand and intra/inter basin diversions
- Irrigation demand based on crop models
- Reservoir operation
- > 1000 nodes in Mekong model


IQQM Version 7.60.6 River System Model- [C:\IQQM\Baseline 12 Mar 06\ChinKrt01v02.sqq]
File Tools Output Run View Graph List Report Help
18 50 00
18 40 00
18 30 00
18 20 00
102 10 00
102 20 00
102 30 00
102 40 00
102 50 00
102 60 00
Geographic Position: 102.548 (Long) 18.764 (Lat)
Select Node or Link
Scale 1:0.001252

iSIS model

- Hydrodynamic model developed by Wallingford/Halcrow, UK
- Applied downstream Kratie for Cambodian plains and the Delta (to cope with backwater effect from tides)
- Output is water level, discharge, salinity intrusion
- Input: Inflow from IQQM, SWAT and tidal fluctuation at sea boundary
- >4000 nodes


GIS Visualiser - C:\Program Files\MRCSDSF\TempData\1125482879\iSIS\1013164512\iSIS_LMB.dat
File View
582449 , 1218287
Type: JUNCTION(OPEN); Nodes CCO05000, CCO5000d, WV000
start
EN 12:24

Knowledge base, observed data

- Is a subset of MRCS database
- Data was checked to be suitable for the models (gap filling, etc)
- More than 400 rainfall stations
- 110 flow stations
- 95 water level stations
- Meteorological data from 38-76 stations
- Data from 300 crop areas

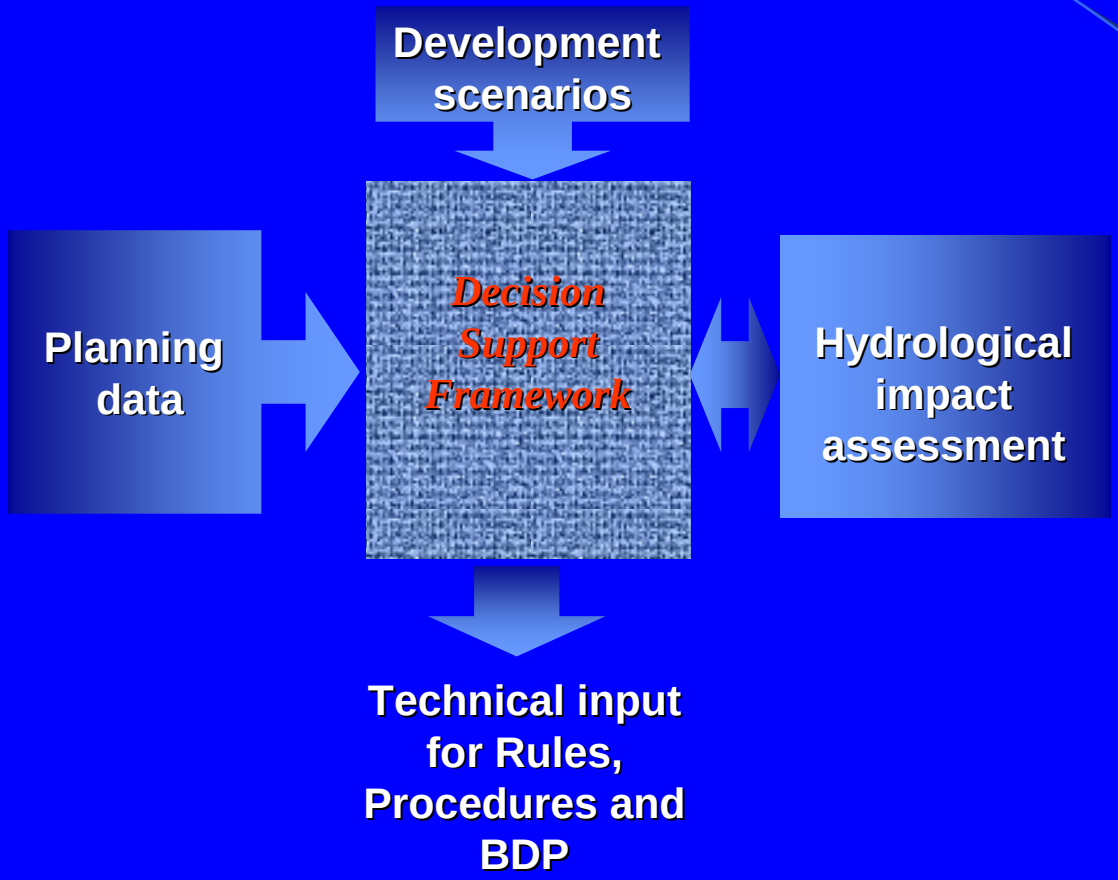
Knowledge base, GIS data

- Rivers
- Catchments
- Sub-areas
- Soil, land use
- Monitoring sites...
- Satellite images
- Etc.

Knowledge base, scenarios

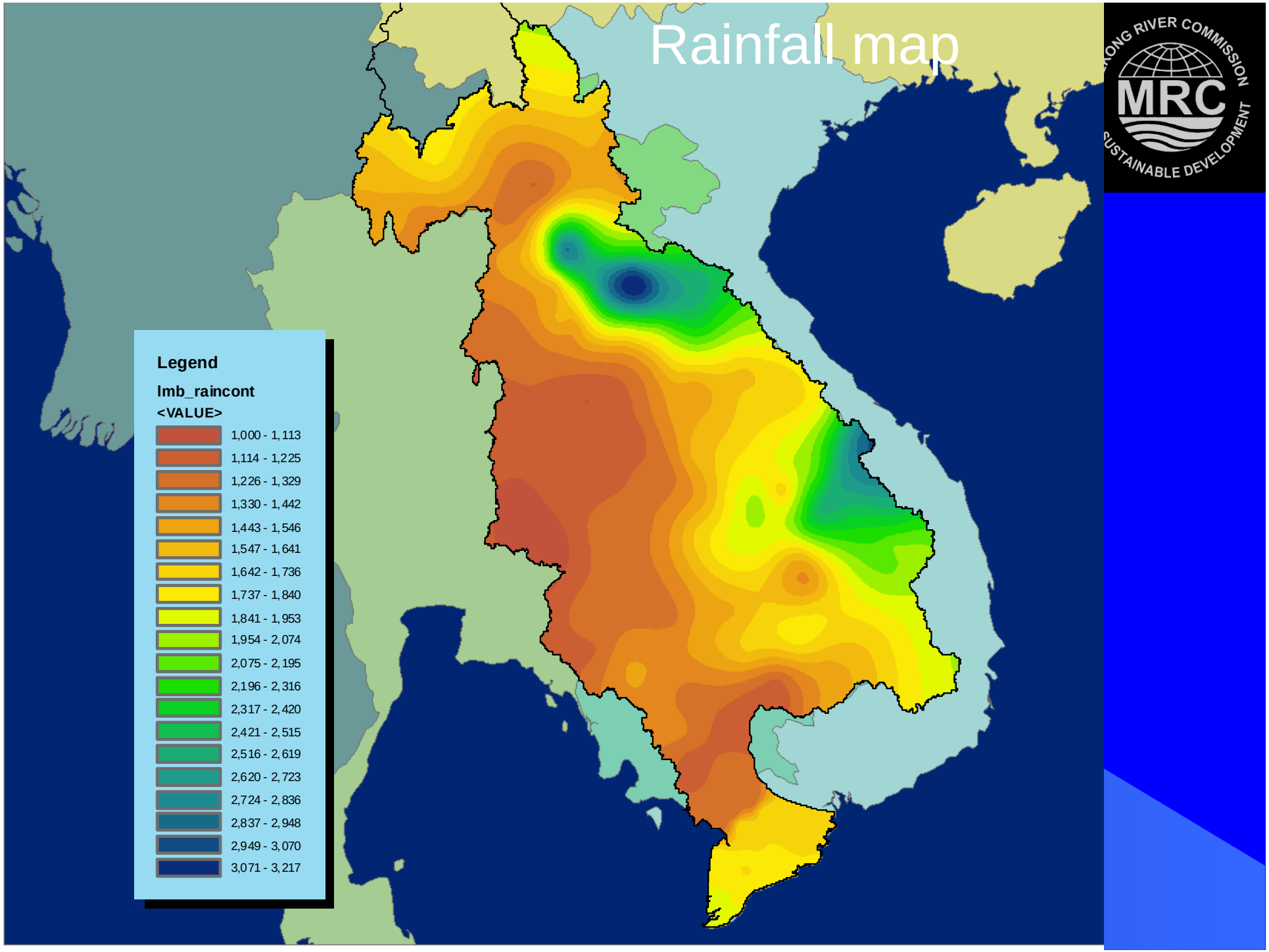
- Store scenario set-ups and results
- Copy scenario to use as base for new scenario
- Enhances trust as model set-up and data can be shared between the riparian countries

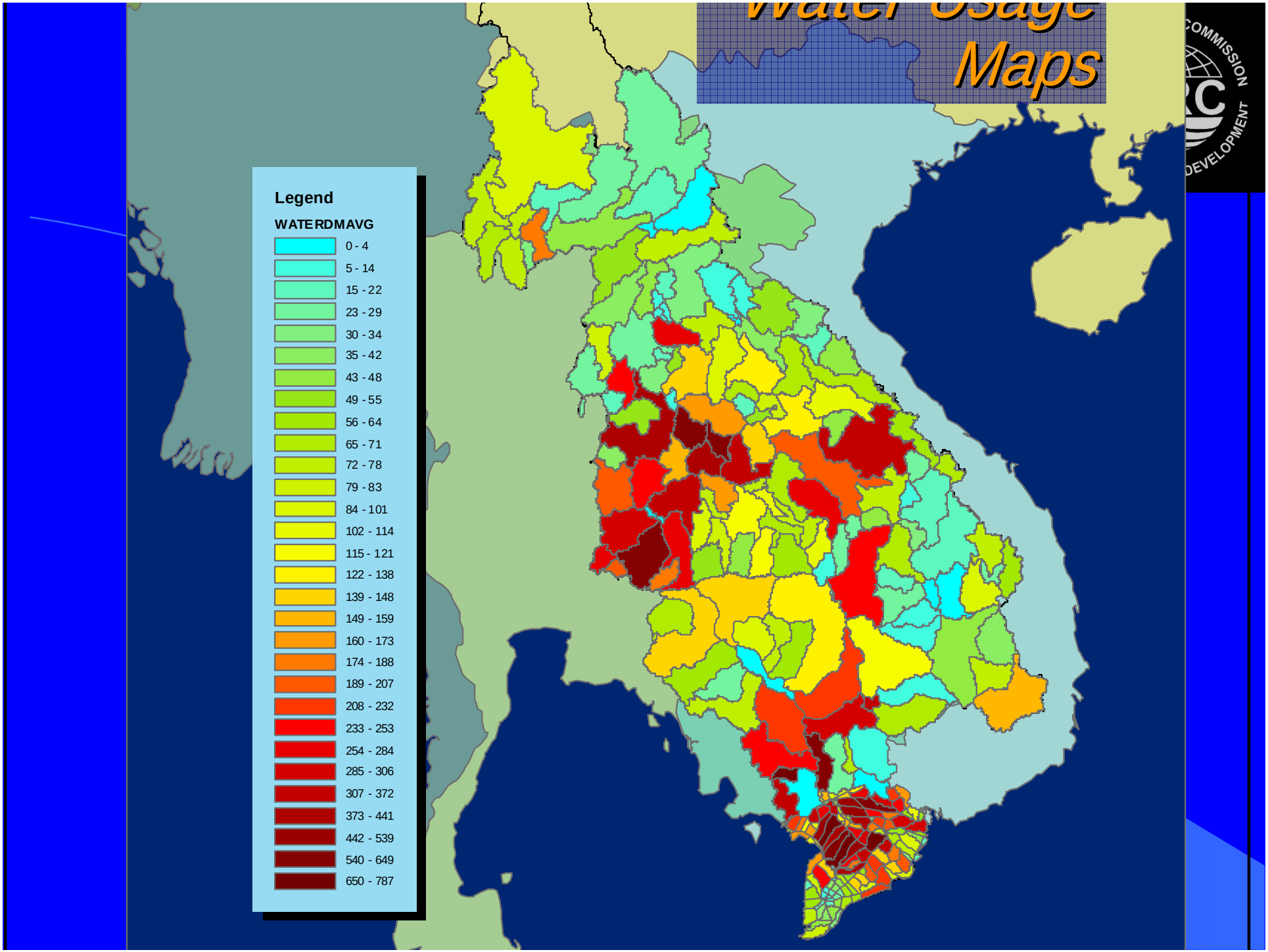
PURPOSE OF THE DSF



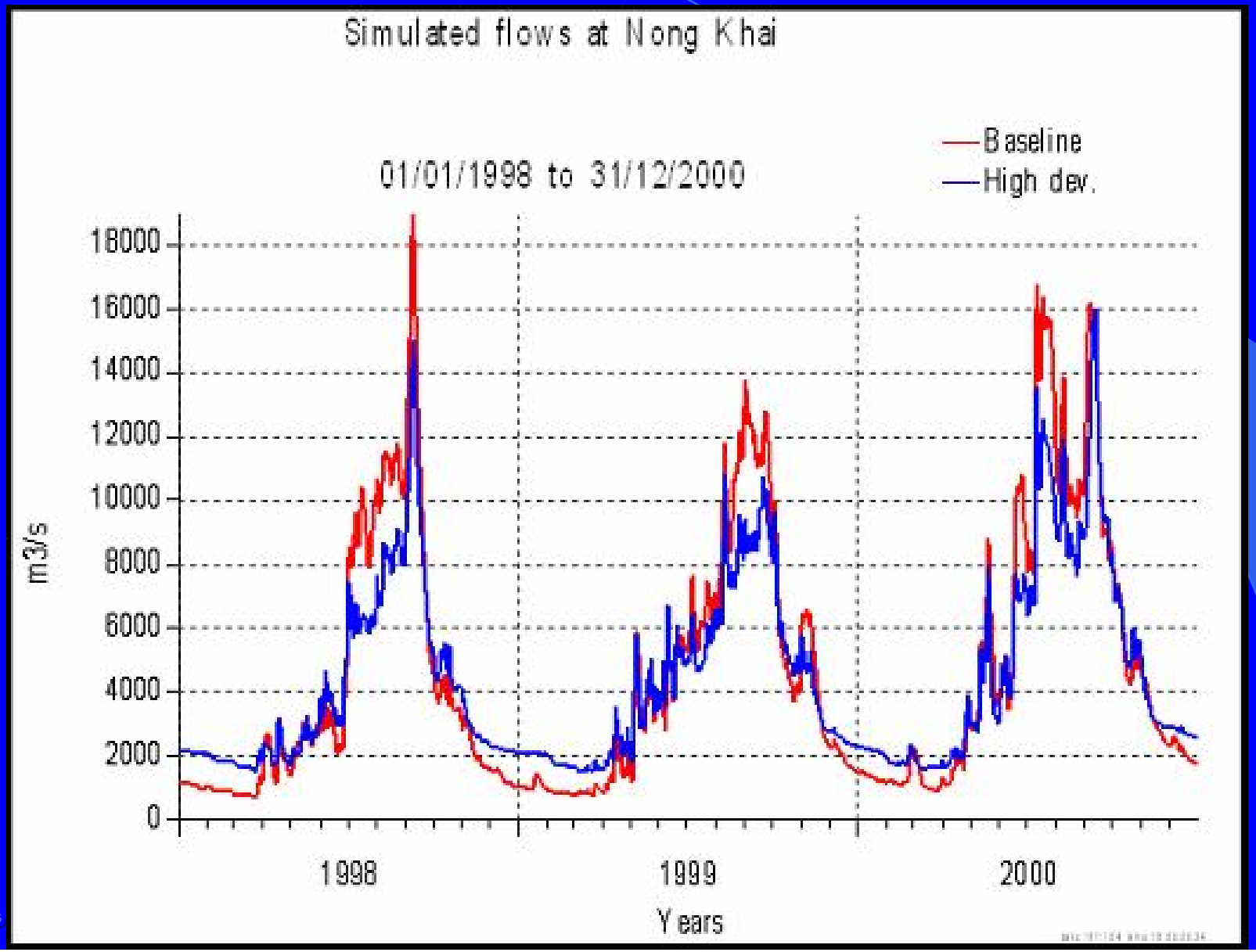
- *Simulation of development scenarios*
- *Analysis of changes in water conditions*
- *Input for impact assessment*
- *Stores acquired knowledge*

Rainfall map




Water Usage
Maps
Legend
WATERDMAVG
0 - 4
5 - 14
15 - 22
23 - 29
30 - 34
35 - 42
43 - 48
49 - 55
56 - 64
65 - 71
72 - 78
79 - 83
84 - 101
102 - 114
115 - 121
122 - 138
139 - 148
149 - 159
160 - 173
174 - 188
189 - 207
208 - 232
233 - 253
254 - 284
285 - 306
307 - 372
373 - 441
442 - 539
540 - 649
650 - 787

DSF flow comparison

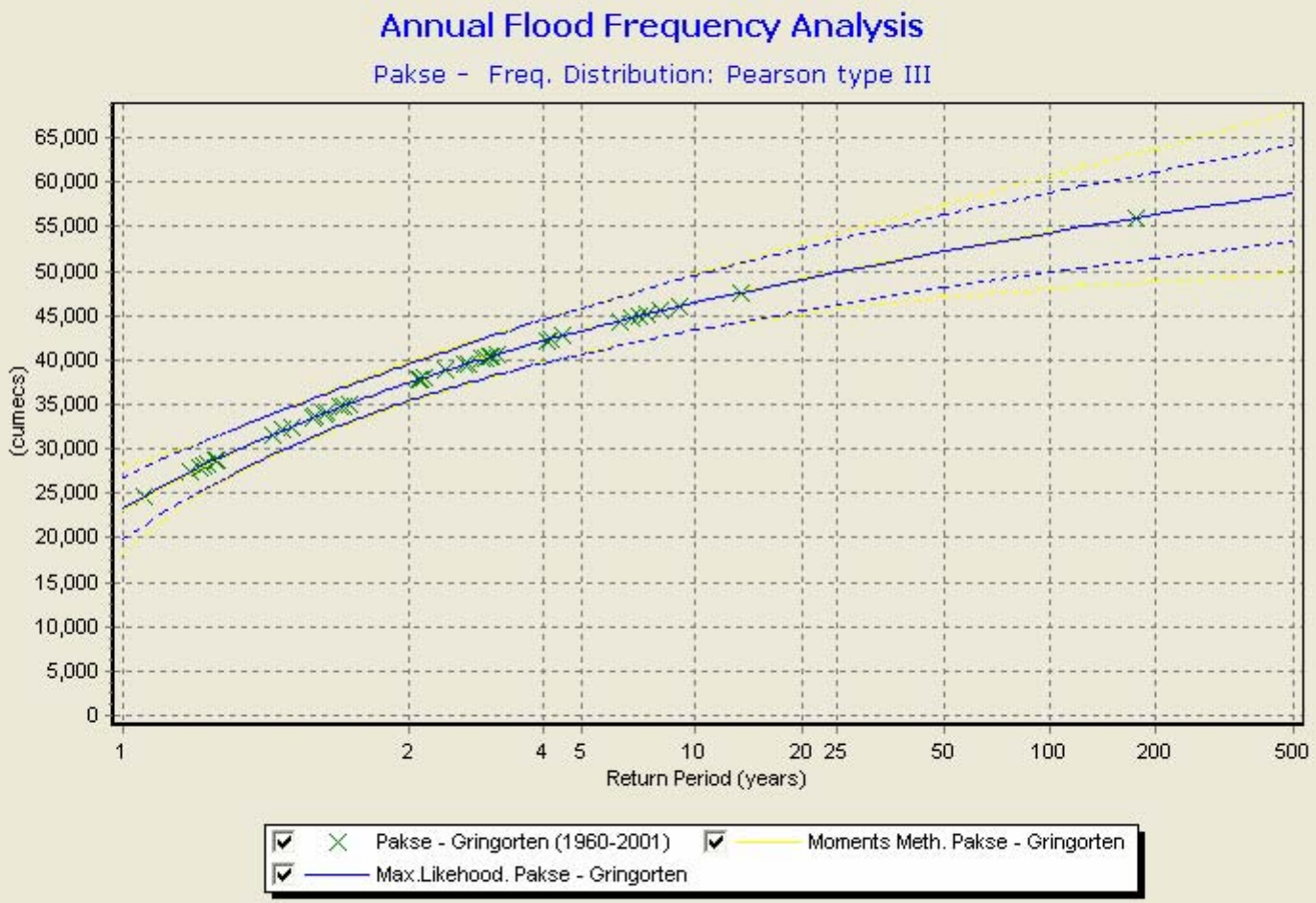


GIS View Tools Run Simulation Model Load Application Help

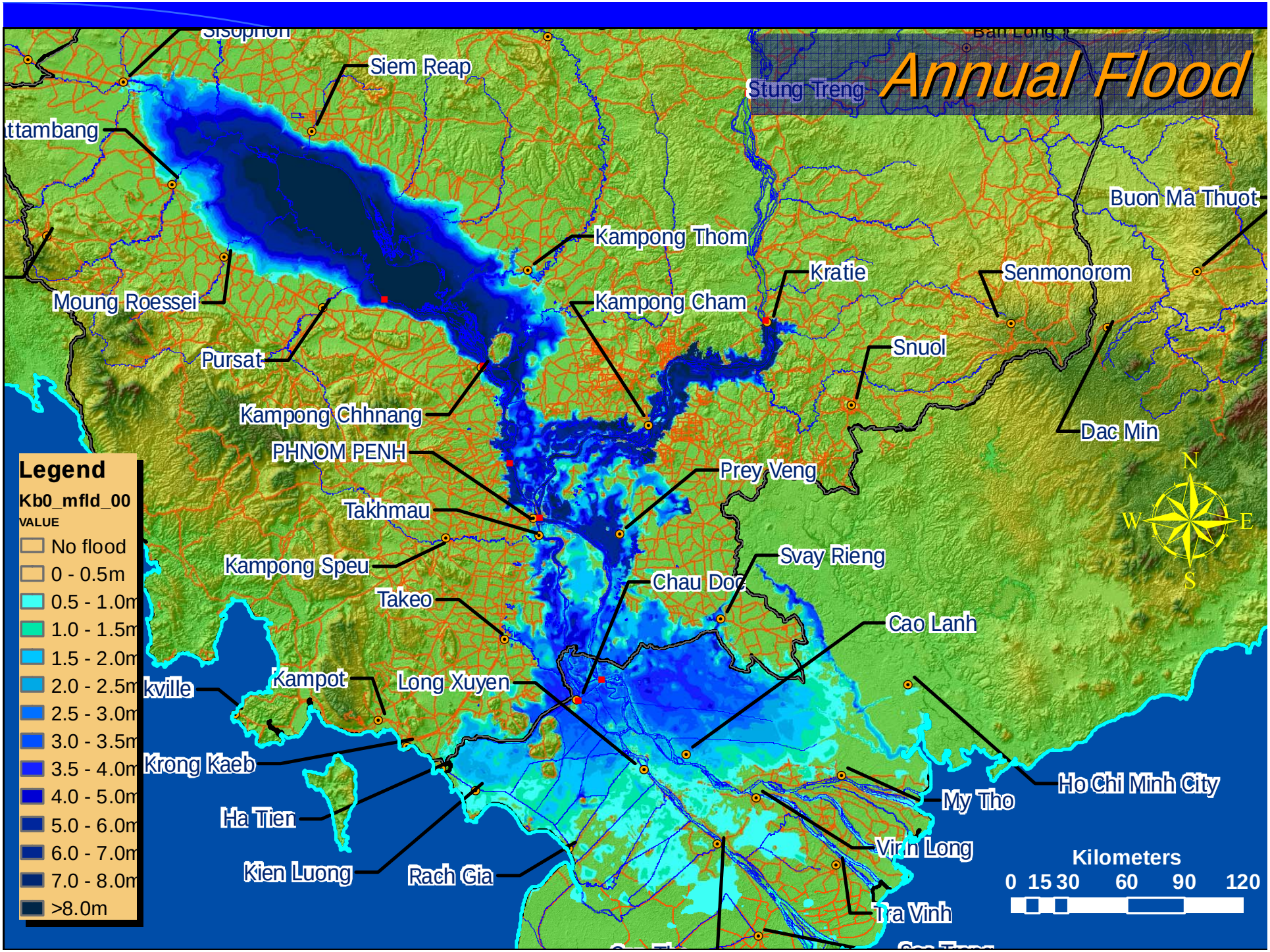
Annual Flood Frequency Analysis

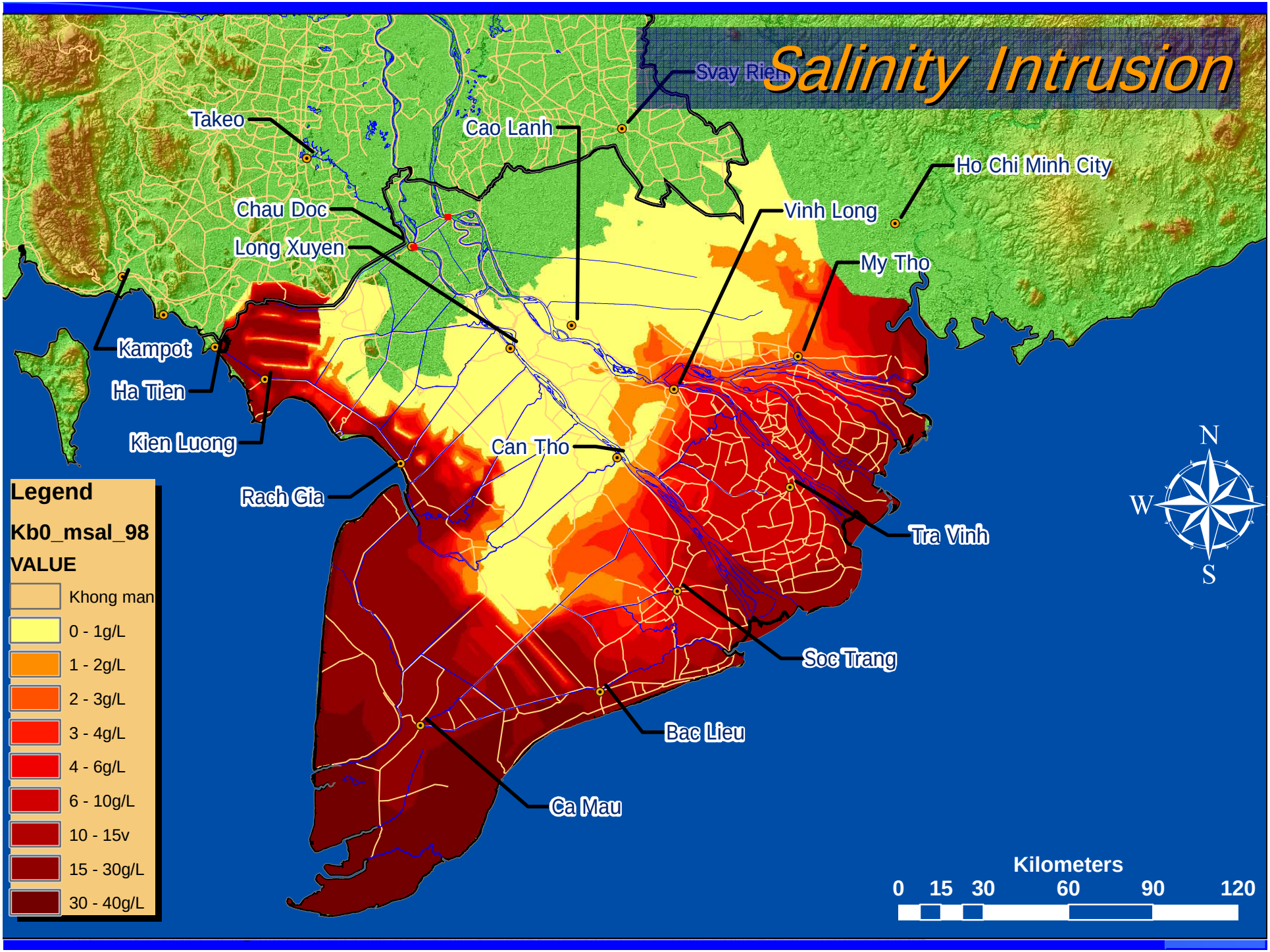
Events Generated | Chart Viewer | Tabular View | Return Period Table

Show 5% and 95% Confidence Intervals ☐ Use Left Mouse to Scroll



View: Geography View Title: Default View (Read-Only)


Annual Flood
Siem Reap
Kampong Thom
Kratie
Senmonorom
Buon Ma Thuot
Moung Roessei
Kampong Cham
Pursat
Snuol
Kampong Chhnang
Dac Min
PHNOM PENH
Prey Veng
Takhmau
Svay Rieng
Kampong Speu
Chau Doc
Takeo
Cao Lanh
Kampot
Long Xuyen
Krong Kaeb
Ho Chi Minh City
My Tho
Ha Tien
Vinh Long
Kien Luong
Rach Gia
Tra Vinh
Legend
Kb0_mfld_00
VALUE
No flood
0 - 0.5m
0.5 - 1.0m
1.0 - 1.5m
1.5 - 2.0m
2.0 - 2.5m
2.5 - 3.0m
3.0 - 3.5m
3.5 - 4.0m
4.0 - 5.0m
5.0 - 6.0m
6.0 - 7.0m
7.0 - 8.0m
>8.0m
N
W
E
S
Kilometers
0 15 30 60 90 120


Salinity Intrusion
Svay Rieng
Takeo
Cao Lanh
Ho Chi Minh City
Chau Doc
Vinh Long
Long Xuyen
My Tho
Kampot
Ha Tien
Kien Luong
Can Tho
Rach Gia
Tra Vinh
Soc Trang
Bac Lieu
Ca Mau
Legend
Kb0_msal_98
VALUE
Khong man
0 - 1g/L
1 - 2g/L
2 - 3g/L
3 - 4g/L
4 - 6g/L
6 - 10g/L
10 - 15v
15 - 30g/L
30 - 40g/L
N
W
S
Kilometers
0 15 30 60 90 120

Capabilities of DSF

To simulate the hydrological regime:

- Basin development scenario analysis (effect of dams, irrigation, diversion, crops...)
- Transboundary impact assessment (embankments, regulation, hydropower...)
- Impact of climate and land use change on flows
- Salt intrusion in Delta
- Sediment transport analysis
- Technical input to formulate rules of water use
- Baseline information (water contribution maps...)

Limitations of DSF

- DSF is mainly a hydrological impact assessment tool
- DSF is a regional model system, not all details can be modelled or taken into account
- Currently only limited environmental modelling capabilities besides hydrology

Important DSF applications

- World Bank scenario study (2004)
- Modelling support for IBFM 2 (2006)
- National Case Studies (8 in 2006)
- National Case Studies (8 in 2007)
- Input to WRCCS study, Nam Ngum basin (2007)

DSF endorsement

- Model set-up and calibration check by International Expert Review Panel, 2003
- Endorsement by Joint Committee, 2004
- Continuous dialogue between MRCS and countries on model enhancements and results (regular official meetings)

Thank you for your attention!

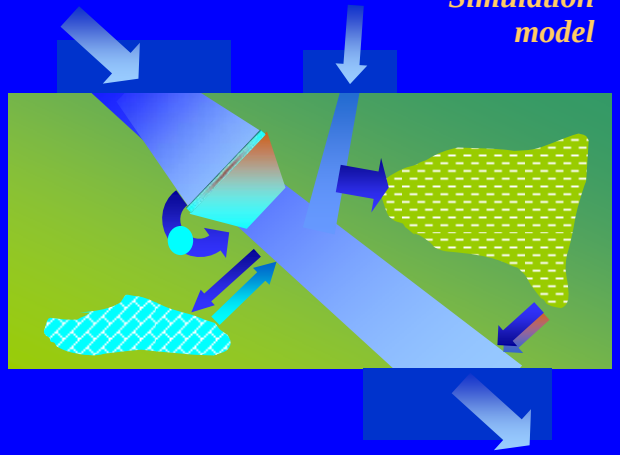
OTHER MODELS

- WUP-FIN models
  - 3D model (grid resolution 50-250 m)
  - 1-2-3 D model
  - flooding
  - Water quality
  - Sediment transport
  - Erosion potential
  - Salinity intrusion
- Mainly for local applications
- Uses DSF output as input (boundary conditions)

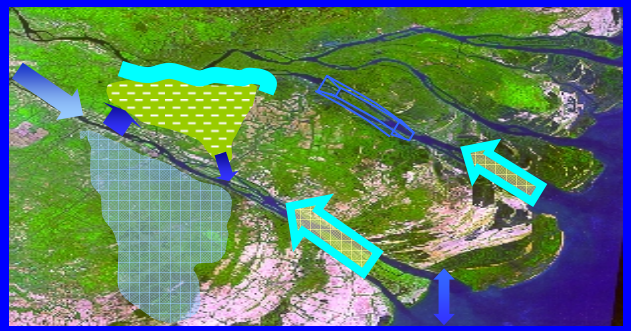
Scope of DSF

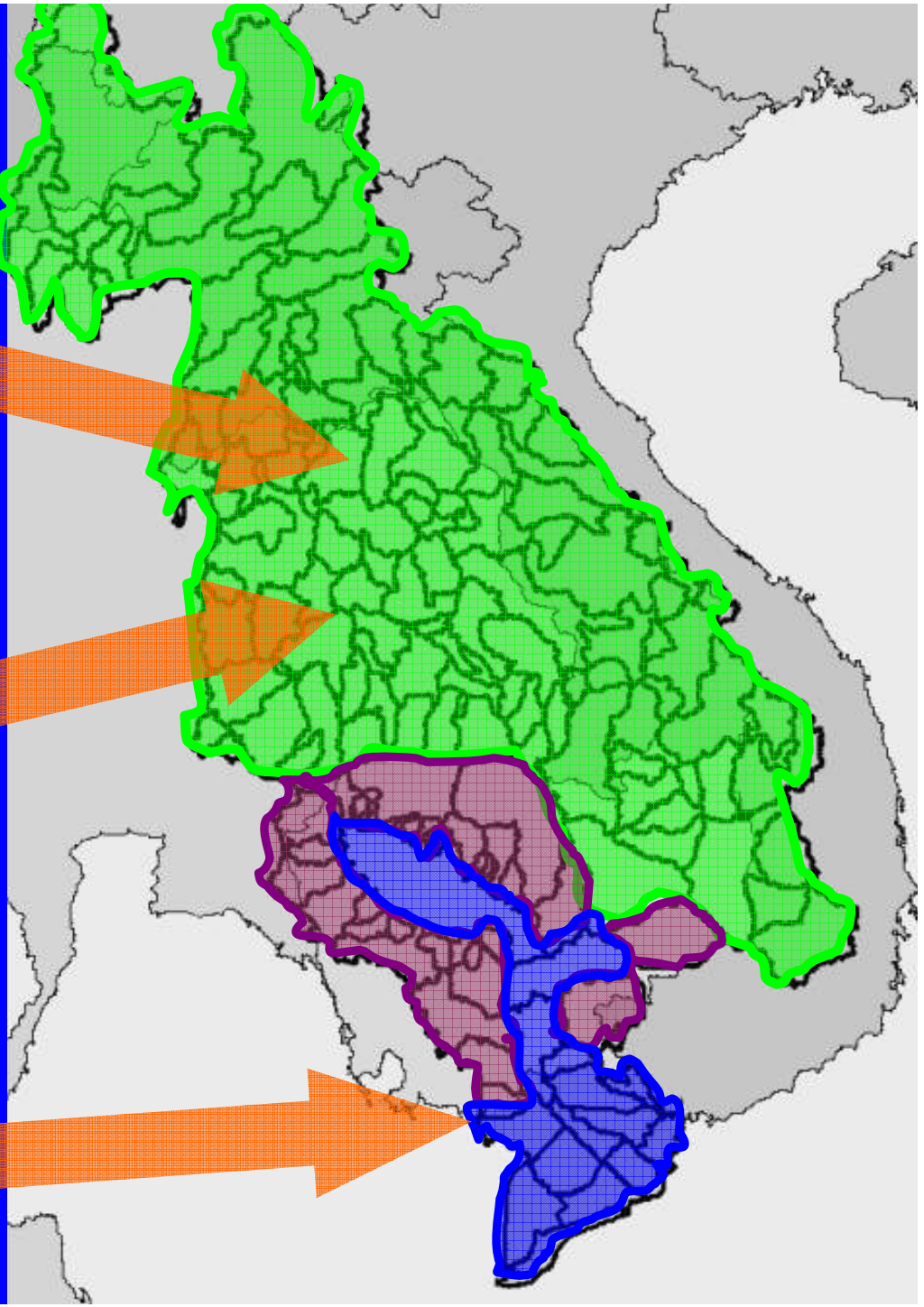
Hydrological model

Simulation model



Hydrodynamic model





Other iSIS applications

- Local applications in tributaries for flood studies
- Sediment transport calculations between Chiang Saen and Pakse in mainstream Mekong

IMPACT ANALYSIS TOOLS

- Graphical tools: plotting time series, maps....
- Statistical tools: annual mean, monthly mean, seasonal mean, duration curves...
- Return periods of floods or drought
- Flood events analysis
- Delta Mapper: Translate iSIS results into spatial maps (floods, salinity intrusion.....)
- Comparison of scenarios

Tan Chau Station

Calibration Results