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BioRA DSS Workshop

Description of hypothetical test scenarios

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

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- Information available to assist testing

- *Allie will discuss the actual results in the next presentation*

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PURPOSE OF TEST/ CALIBRATION SCENARIOS

Purpose of test/calibration scenarios

- Test/calibration scenarios are constructed with the sole purpose of checking and if necessary adjusting DSS predictions
- They represent hypothetical and possibly unrealistic conditions in the system, such as:
  - Extended periods of flood or drought
  - Changes in durations of the seasons
  - Extended period of low sediment delivery
  - Barriers to fish
- They are not development scenarios but may represent conditions partly similar to cumulative impacts of developments in various sectors

Purpose of calibration

- Ensure DSS provides defensible predictions for test/calibration scenarios
- Thus, will also provide defensible answers for other scenarios
- Important step in validating the DSS and subsequent DSS outputs when applied to assess impacts of development scenarios

Understanding the DSS response to an hypothetical scenario requires:

- check how hydrology, hydraulic, water quality, sediments or connectivity changed relative to Prelim. Reference Scenario
- follow the links from an indicator to the hydrology, hydraulic, water quality, sediments or connectivity
- checking whether the response is reasonable in the light of:
    - changes in the hydrology, hydraulic, water quality, sediments or connectivity
    - changes in linked indicators
    - observed changes
    - evidence/explanations provided by specialists

Two types of scenarios

1. Calibration scenarios (CS), which were used during the preliminary calibration as reported in the Interim Technical Report Vol. 3

2. Test scenarios (TS), which were developed for this workshop

Two types of scenarios

1. Calibration scenarios (CS), which are reported on in the Interim Technical Report Vol. 3

2. Test scenarios (TS), which were developed for this workshop and have not been tested before n them

Will discuss in the afternoon after the calibration scenarios

CALIBRATION SCENARIOS

Calibration scenarios

CS 1: High dry season flow, low wet season flow

CS 2: 6 dry years, followed by 6 wet years, etc.

CS 3: A shortened wet season

CS 4: Sediment supply at 75% of Prelim. Reference

CS 5: Migration blocked between FA1 and FA2 ONLY

CS 7: Extreme dry year (1992 – 10%)

CS 8: Migration blocked between FA4 and 5 ONLY

CS 9: Migration blocked between FA1 and 2 AND between FA4 and 5

CS 10: Sediment supply at 25% of Prelim. Reference

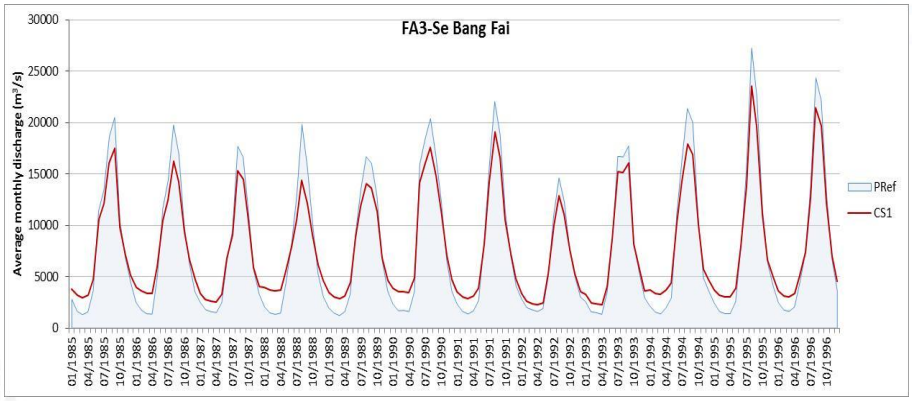
CSs represent changes in individual parameters…

- Each calibration scenario focuses on a single aspect – e.g., flow change, barrier or sediment reduction.
- In reality one would not occur without the other, and the impact on the ecosystem would be a result of the combined effects of both.
- For instance, if a dam is constructed for hydropower generation, it is likely that it will affect migration, sediment supply, and change the flows

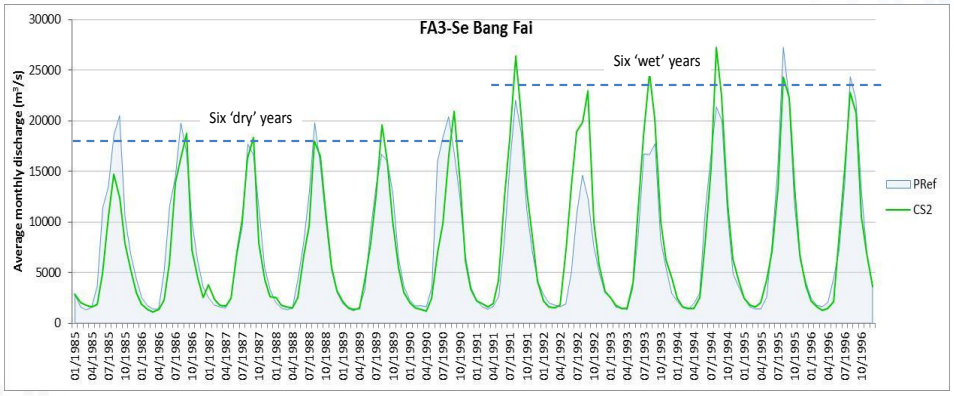
Relationship between CSs

- CS1, CS2, CS3 and CS7 differ hydrologically from one another and from the Prelim. Reference Scenario, but are identical in terms of connectivity
- CS4, CS5, CS8, CS9 and CS10 are hydrologically the same as the Prelim. Reference Scenario, but differ in terms of:
  - CS4 and 10: reduced sediment supply
  - CS5, 8 and 9: barriers to fish migration

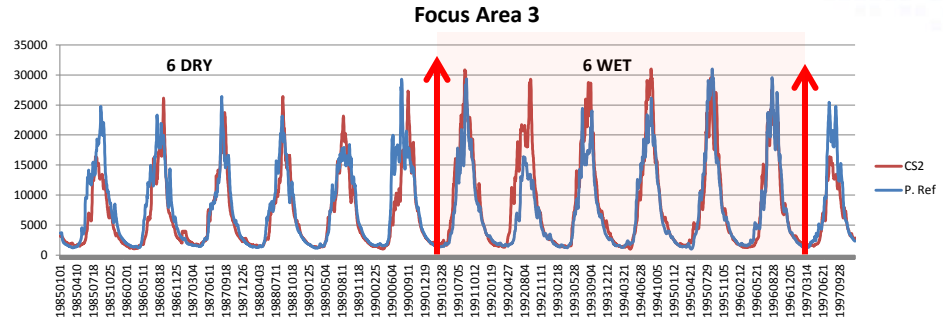
CS 1: High dry season flow, low wet season flow



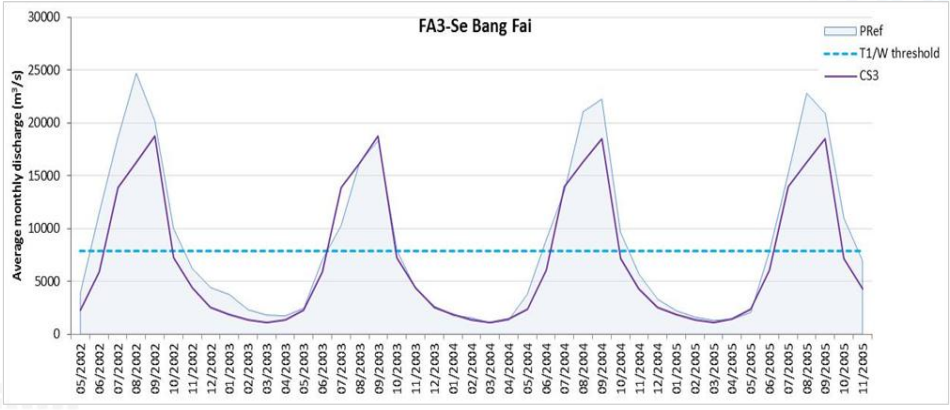
CS 2: 6 dry, 6 wet, etc.



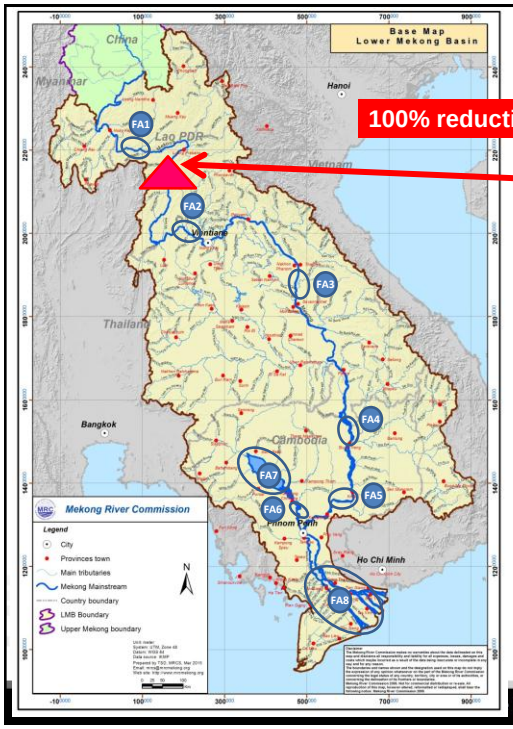
CS 2: 6 dry, 6 wet, etc.



CS 3: A shortened wet season



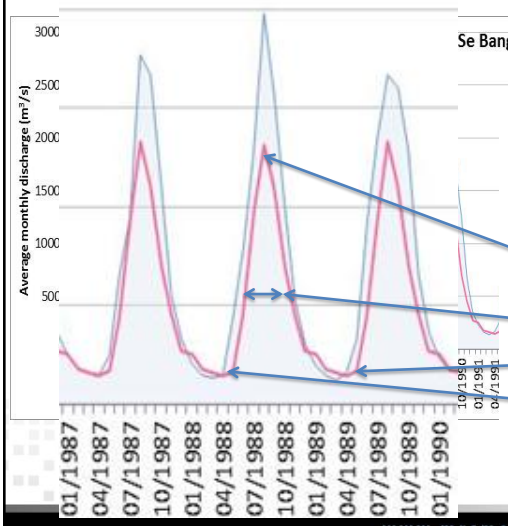
CS 4: Sediment supply at 75% of preliminary reference



100% reduction in migration

CS 5: Migration blocked between FA1 and FA2

CS 7: Extreme dry year (1992 – 10%) repeated



It is important to check closely!

Relative to Pref, CS7:

- does have lower wet season
- but also has:
  - shorter wet season
  - higher dry season
  - later start to wet season

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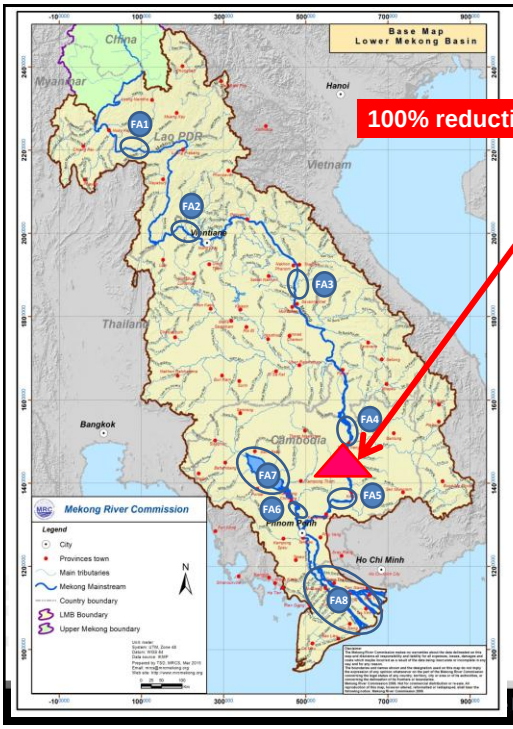

100% reduction in migration

CS 8: Migration blocked between FA4 and FA5

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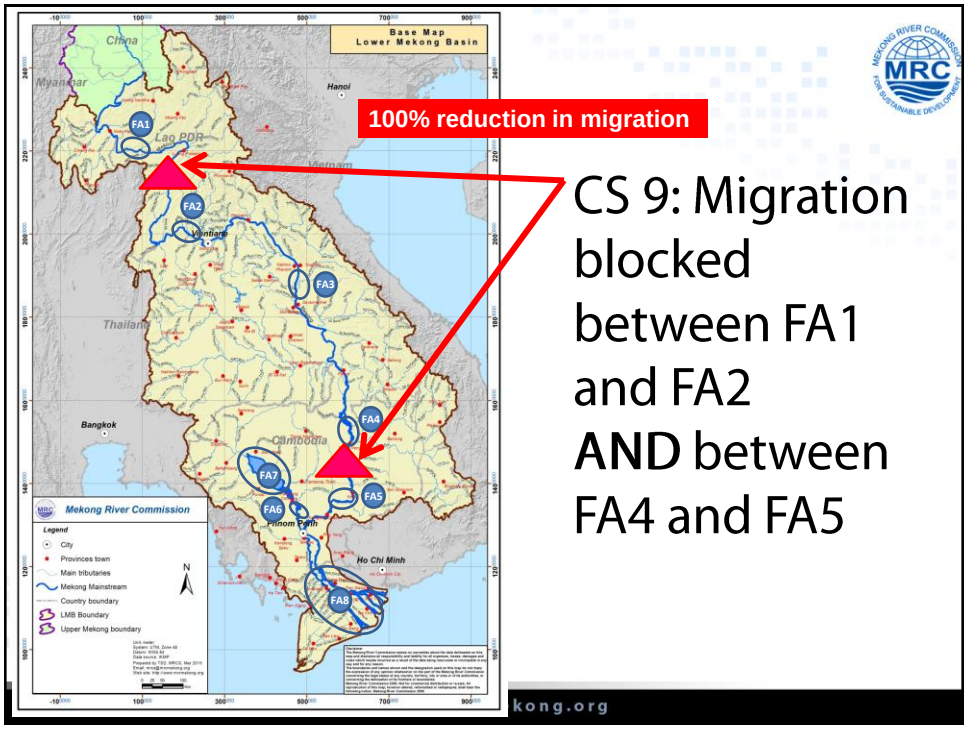

CS 10: Sediment supply at 75% of preliminary reference

INFORMATION PROVIDED

Information available to assist testing

- Preliminary Calibration Report
- Summary spreadsheets
- Summary results sheets
- ECO-LMB
  - All of the above, plus:
    - Individual and combined time-series
    - Evidence-based explanations
    - Response Curves

Handouts: Changes in hydrology, hydraulics, WQ and sediment indicators for CS1

		FA1		FA2		FA3		FA4		FA5		FA6		FA7	
Indicator	Units	PRef	Change	PRef	Change	PRef	Change	PRef	Change	PRef	Change	PRef	Change	PRef	Change
Mean annual runoff / depth	m^3/s	3096	-1019	4679	-1587	7893	-2710	12500	-3756	12383	-3460	14	-	3	-
Dry onset	week	48	-14	50	-3	49	-2	49	-2	50	-3	49	-	52	-
Dry duration	days	197	123	168	59	172	36	175	32	173	31	190	-	192	-
Dry Min 5day Q / depth	m^3/s	802	186	961	125	1273	96	1788	-282	1809	-306	11	-	0	-
Wet onset	week	26	4	25	3	24	4	25	5	25	4	31	-	33	-
Wet duration	days	143	-110	148	-55	143	-54	136	-45	138	-45	128	-	138	-
Wet Max 5day Q / depth	m^3/s	11003	-6277	15508	-7259	25471	-10912	42350	-9690	38568	-7248	18.59	-	7.75	-
Flood volume	10^9 m^3	69021	-57606	109007	-60617	194941	-104466	302808	-130968	298285	-123157	193.55	-	77.19	-
Dry ave daily vol	10^9 m^3	116	44	129	15	183	4	265	-15	272	-16	1	-	0	-
T1 ave daily vol	10^9 m^3	255	2	317	88	559	-50	800	36	816	28	1	-	0	-
Wet ave daily vol	10^9 m^3	488	-142	755	-235	1348	-331	2362	-474	2276	-393	2	-	1	-
T2 ave daily vol	10^9 m^3	227	-16	288	70	490	13	691	40	719	43	1	-	0	-
T1 onset	week	24	4	21	0	21	7	22	2	22	3	25	-	29	-
T2 onset	week	46	-12	46	0	44	-10	45	-3	45	-2	49	-	53	-
Dry: ave w/in day Range	m^3/s	33	7	30	1	42	-13	115	-32	86	-26	0	-	0	-
T1: ave w/in day Range	m^3/s	198	-148	184	-139	319	-217	676	-316	488	-219	0	-	0	-
T2: ave w/in day Range	m^3/s	65	19	74	3	130	5	312	-133	244	-80	0	-	0	-
D: ave Sediment conc	mg/l	110	10	98	18	99	0	21	-3	31	-1	-	-	-	-
T1: ave Sediment conc	mg/l	292	-160	201	-77	182	0	61	-28	96	-43	-	-	-	-
W: ave Sediment conc	mg/l	509	-216	514	-226	509	0	291	-111	403	-110	-	-	-	-
T2: ave Sediment conc	mg/l	214	-46	188	-24	219	0	71	-17	96	-18	-	-	-	-
W: ave Sediment Onset	week	30	-1	31	-2	30	0	31	1	32	1	13	-	30	-
W: ave Sediment Duration	days	62	38	60	34	58	3	50	-2	53	-8	215	-	117	-
W: ave FP Onset inundation	week	-	-	-	-	22	3	100	0	22	2	-	-	-	-
W: ave FP Duration inundation	days	-	-	-	-	183	-26	100	0	187	-24	-	-	138	-
W: ave FP Area inundation	km^2	-	-	-	-	39	-36	0	0	305	-107	-	-	8102	-
Connectivity	%PRef	100	0	100	0	100	0	100	0	100	0	100	-	100	-

Indicator Handc

Indicators	Calibration scenarios								
	CS1	CS2	CS3	CS4	CS5	CS7	CS8	CS9	CS10
Discipline : Geomorphology									
Erosion (bank / bed incision)	-4.9	0.7	-10.1	9.2	0.7	-8.7	0.7	0.7	36.4
Average bed sediment size - dry season	1.0	0.8	0.6	1.2	0.3	1.1	0.3	0.3	2.5
Availability exposed sandy habitat - dry season	7.9	-5.3	4.1	-4.5	0.2	4.8	0.2	0.2	-20.8
Availability inundated sandy habitat -dry season	1.9	0.4	2.3	-5.2	-2.0	-0.4	-2.0	-2.0	-15.4
Availability exposed rocky habitat -dry season	-1.0	-5.0	-7.3	7.2	1.0	-3.3	1.0	1.0	25.2
Availability inundated rocky habitat -dry season	3.2	2.8	0.8	-0.4	-1.6	-1.5	-1.6	-1.6	1.6
Depth of bedrock pools in dry season	-7.1	-0.3	-4.7	5.3	0.2	-7.7	0.2	0.2	12.3
Water clarity	1.2	27.5	38.9	16.4	1.2	53.6	1.2	1.2	242.4
Discipline : Vegetation									
C: Riparian trees	-19.0	-6.3	-0.1	-1.8	-1.8	-37.5	-1.8	-1.8	-1.8
C: Extent upper bank veg cover	-39.3	6.4	-42.8	4.1	1.0	-81.3	1.0	1.0	18.6
C: Extent lower bank veg cover	-79.2	-1.2	-10.9	3.5	-0.8	-3.7	-0.8	-0.8	19.8
C: Weeds, grasses on sandbanks and sandbars	-25.2	-5.1	-0.5	-1.6	-0.9	17.3	-0.9	-0.9	-4.3
C: Biomass riparian veg	-76.6	-4.1	-36.5	2.9	-2.0	-31.1	-2.0	-2.0	20.2
C: Biomass algae	-6.8	8.4	15.4	3.4	1.4	21.4	1.4	1.4	55.4
Discipline : Macro-invertebrates									
Insects on stones	-4.9	-0.5	1.4	-2.3	-1.9	1.7	-1.9	-1.9	6.6
Insects on sand	-1.9	1.3	3.9	-1.3	-1.1	3.5	-1.1	-1.1	11.5
Burrowing mayflies	-3.9	0.1	2.0	-1.4	-0.5	2.6	-0.5	-0.5	7.6
Snail abundance	6.9	3.5	3.6	0.8	0.3	10.6	0.3	0.3	12.1
Diversity of snails	-5.4	-0.8	1.2	-1.8	-1.0	2.0	-1.0	-1.0	3.6
Bivalves abundance	-9.1	0.9	4.8	-3.2	-0.1	4.4	-0.1	-0.1	12.0
Shrimps and crabs	-2.5	1.3	3.3	0.1	-0.4	5.0	-0.4	-0.4	11.4
Littoral invertebrate diversity	-5.6	-0.8	1.4	-1.9	-1.1	2.3	-1.1	-1.1	4.2
Benthic invertebrate diversity	-6.1	-1.4	-0.1	-2.9	-1.8	1.4	-1.8	-1.8	0.7
Zooplankton abundance	-0.7	1.7	2.9	0.9	0.5	-17.6	0.5	0.5	11.0
Benthic invertebrate biomass	-2.6	1.1	3.2	-1.2	-0.6	4.6	-0.6	-0.6	10.2
Dry season insect emergence	-3.6	0.3	2.5	-1.7	-1.2	2.6	-1.2	-1.2	8.8
Discipline : Fish									
Rhithron resident	41.2	-0.8	8.4	0.0	-1.9	73.2	-1.9	-1.9	10.3
Main channel resident (long distance white)	95.4	-11.2	-53.3	3.3	-68.0	-9.6	-13.9	-68.0	2.1
Main channel spawner (short distance white)	26.2	-8.6	-28.8	-10.9	-44.5	-61.0	-2.8	-44.5	-18.2
Eurytopic (generalist)	-32.2	0.4	-16.6	-11.3	-1.1	-25.1	-1.1	-1.1	-13.1
Discipline : Herpetofauna									
Ranid and microhylid amphibians	-49.6	-2.7	-25.1	4.7	-1.6	-76.4	-1.6	-1.6	11.4
Aquatic serpents	-39.7	-7.2	-44.1	-1.4	-22.2	-57.9	-1.4	-22.2	8.1
Species richness of riparian/FP amphibians	-46.9	-3.5	-20.6	8.1	-0.4	-38.4	-0.4	-0.4	11.7
Species richness of riparian/FP reptiles	-55.4	-9.4	-46.5	-1.6	-16.2	-46.6	-0.6	-16.2	6.3
Discipline : Birds									
Medium/large ground-nesting channel spp	-1.3	-2.9	4.1	-5.6	-2.9	5.1	-2.9	-2.9	-9.0
Bank / hole nesting species	-0.6	-3.9	-1.1	-2.3	-2.2	-1.8	-2.2	-2.2	-1.6
Small non-flocking landbird;seasonally flooded veg	-44.7	1.0	-2.5	1.3	-0.1	-0.1	-0.1	-0.1	10.0

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