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For sustainable development




BioRA DSS Workshop

Overall results for the calibration scenarios

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



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Contents



- Definition of overall integrity
- Inputs to DSS
- Examples of results
- Interrogating results

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DEFINITION OF INTEGRITY

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Definition of ecological integrity

The ecological integrity of a river system is defined as its ability to support and maintain a balanced, integrated composition of physico-chemical and habitat characteristics, and biotic components on a temporal and spatial scale that are comparable to the natural characteristics of ecosystems of the region.

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Integrity categories



A	Unmodified, natural	As close as possible to natural conditions.
B	Largely natural	Modified from the original natural condition but not sufficiently to have produced measurable change in the nature and functioning of the ecosystem/community.
C	Moderately modified	Changed from the original condition sufficiently to have measurably altered the nature and functioning of the ecosystem/community, although the difference may not be obvious to a casual observer.
D	Largely modified	Sufficiently altered from the original natural condition for obvious impacts on the nature and functioning of the ecosystem/community to have occurred.
E	Completely modified	Important aspects of the original nature and functioning of the ecosystem community are no longer present. The area is heavily negatively impacted by human interventions.

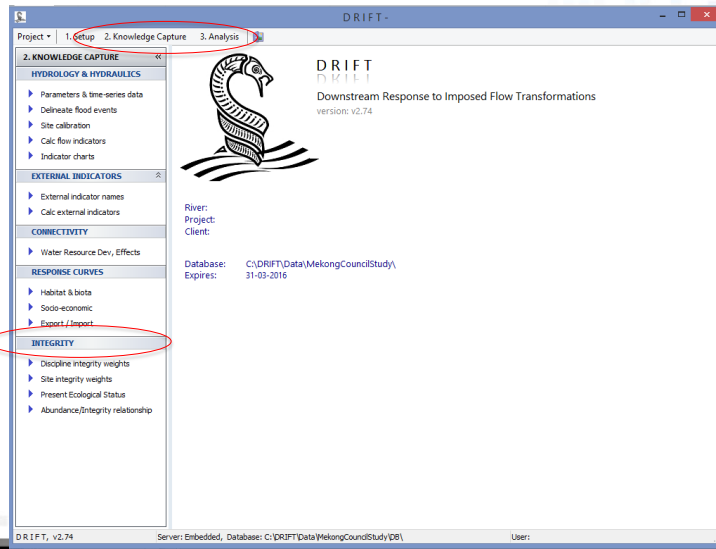
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INPUTS TO DSS

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DSS Integrity Module



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Calculating integrity



For a scenario:

- Each indicator's final score (end of period)
- + or – added for a move towards or away from natural
- Weighted average = Integrity
- Can be calculated per discipline or for all disciplines (overall integrity)

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DSS: Integrity sub-section



- Weights for each indicator for calculating discipline level integrity;
- Weights for each discipline for calculating site level integrity;
- Ecological status of each discipline at each site; and
- Abundance vs. integrity relationships for each indicator at each site.

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Discipline integrity weights



Project - 1. Setup 2. Knowledge Capture 3. Analysis DRIFT -

2. KNOWLEDGE CAPTURE << Integrity / Discipline integrity weights

HYDROLOGY & HYDRAULICS

- Parameters & time-series data
- Delineate flood events
- Site calibration
- Calc flow indicators
- Indicator charts

EXTERNAL INDICATORS

- External indicators
- Calc external indicators

CONNECTIVITY

- Water Resource Dev, Effects

RESPONSE CURVES

- Habitat & biota
- Socio-economic
- Export / Import

INTEGRITY

- Discipline integrity weights**
- Site integrity weights
- Present Ecological Status
- Abundance/Integrity relationship

Discipline	Indicator	FA1-Pak Beng	FA2-Vientiane	FA3-Se Bang Fai	FA4-Stung Treng	FA5-Kampong Cham
Birds	Medium/large ground-nesting channel sp	1.0	1.0	1.0	1.0	
Birds	Bank / hole nesting species	1.0	1.0	1.0	1.0	1.0
Birds	Small non-flooding landbird;seasonally flo	1.0	1.0		1.0	1.0
Birds	Natural rocky crevice nester in channels		1.0	1.0	1.0	
Birds	Tree-nesting large waterbirds.				1.0	
Birds	Flocking non-aerial pass of gramnoid bec				1.0	1.0
Birds	Channel-using large spp: bankside forest				1.0	
Birds	Dense woody vegetation / water interfac				1.0	
Birds	Large ground-nesting spo: wetland FP					
Fish	Rhithron resident	1.0	1.0	1.0	1.0	1.0
Fish	Main channel resident (long distance whit	1.0	1.0	1.0	1.0	1.0
Fish	Main channel spawner (short distance wt	1.0	1.0	1.0	1.0	1.0
Fish	Eurytopic (generalist)	1.0	1.0	1.0	1.0	1.0
Fish	Non-native	1.0	1.0	1.0	1.0	1.0
Fish	Conn: Fish from tributaries	0.0	0.0	0.0	0.0	0.0
Fish	Conn: Fish from upstream	0.0				
Fish	Comp: Fish biomass	0.0	0.0	0.0	0.0	0.0
Fish	Comp: Main channel resident	0.0	0.0	0.0	0.0	0.0
Fish	Comp: Main channel spawner	0.0	0.0	0.0	0.0	0.0
Fish	Floodplan spawner (grey)			1.0	1.0	1.0
Fish	Floodplan resident (black fish)			1.0	1.0	1.0
Fish	Anadromous			1.0	1.0	1.0
Fish	Comp: Anadromous			0.0	0.0	0.0

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Site integrity weights

Project | 1. Setup | 2. Knowledge Capture | 3. Analysis | DRIFT

2. KNOWLEDGE CAPTURE > Integrity / Site integrity weights

HYDROLOGY & HYDRAULICS

- Parameters & time-series data
- Delineate flood events
- Site calibration
- Calc flow indicators
- Indicator charts

EXTERNAL INDICATORS

- External indicators
- Calc external indicators

CONNECTIVITY

- Water Resource Dev, Effects

RESPONSE CURVES

- Habitat & biota
- Socio-economic
- Export / Import

INTEGRITY

- Discipline integrity weights
- Site integrity weights
- Present Ecological Status

Discipline	FA1-Pak Beng	FA2-Vientiane	FA3-Se Bang Fai	FA4-Stung Treng	FA5-Kampong Cham	FA6-Tonle Sap River
Geomorphology	1.0	1.0	1.0	1.0	1.0	1.0
Vegetation	1.0	1.0	1.0	1.0	1.0	1.0
Macro-invertebrates	1.0	1.0	1.0	1.0	1.0	1.0
Fish	1.0	1.0	1.0	1.0	1.0	1.0
Herpetofauna	1.0	1.0	1.0	1.0	1.0	1.0
Birds	1.0	1.0	1.0	1.0	1.0	1.0
Non-water resource pressures	0.0	0.0	0.0	0.0	0.0	0.0
Mammals		1.0		1.0		

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Ecological Status (from S7T assessments)



Project | 1. Setup | 2. Knowledge Capture | 3. Analysis | DRIFT

2. KNOWLEDGE CAPTURE > Integrity / Present Ecological Status

HYDROLOGY & HYDRAULICS

- Parameters & time-series data
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CONNECTIVITY

- Water Resource Dev, Effects

RESPONSE CURVES

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- Export / Import

INTEGRITY

- Discipline integrity weights
- Site integrity weights
- Present Ecological Status
- Abundance/integrity relationship

Discipline	FA1-Pak Beng	FA2-Vientiane	FA3-Se Bang Fai	FA4-Stung Treng	FA5-Kampong Cham	FA6-Tonle Sap River
Geomorphology	B/C	B/C	B/C	B/C	B/C	B
Vegetation	B/C	B/C	C	B/C	B/C	D/E
Macro-invertebrates	B/C	B/C	B/C	B/C	B/C	B/C
Fish	C/D	C/D	C/D	B/C	B/C	B/C
Herpetofauna	C	C	C	C/D	C/D	C/D
Birds	C/D	C/D	D	C/D	C/D	D
Non-water resource pressures	C	C	C	C	C	C
Mammals		E		E		

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Abundance/Integrity relationships



DRIFT -

Project • 1. Setup 2. Knowledge Capture 3. Analysis

2. KNOWLEDGE CAPTURE << Integrit / Abundance/Integrity relationship

HYDROLOGY & HYDRAULICS Edit Save

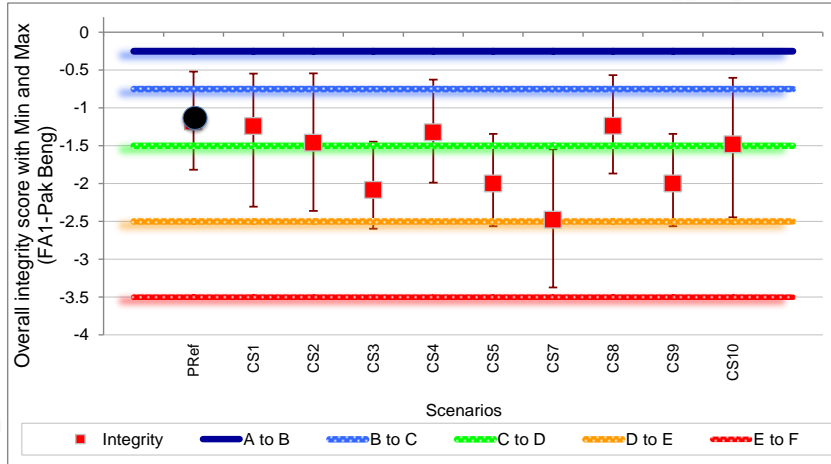
Indicator	FA1-Pak Beng	FA2-Vientiane	FA3-Se Bang Fai	FA4-Stung Treng	FA5-Kampong Cham	FA6-Tonle Sap River
Birds						
Medium/large ground-nesting channel spp	Towards	Towards	Towards	Towards		
Bank / hole nesting species	Towards	Towards	Towards	Towards	Towards	Towards
Small non-flocking landbird;seasonally flo	Towards	Towards		Towards	Towards	Towards
Natural rocky crevice nester in channels		Towards	Towards	Towards		
Tree-nesting large waterbirds				Towards		
Flooding non-aerial pass of grassland bed				Towards	Towards	Towards
Channel-using large spp; bankside forest					Towards	
Dense woody vegetation / water interfa				Towards		
Large ground-nesting spp; wetland FP						
Fish						
Rhithron resident	Towards	Towards	Towards	Towards	Towards	
Main channel resident (long distance whi)	Towards	Towards	Towards	Towards	Towards	Towards
Main channel spawner (short distance whi)	Towards	Towards	Towards	Towards	Towards	Towards
Eurytopic (generalist)	Towards	Towards	Towards	Towards	Towards	Towards
Non-native	Away	Away	Away	Away	Away	Away
Conn: Fish from tributaries	Towards	Towards	Towards	Towards	Towards	Towards
Conn: Fish from upstream	Towards					
Comp: Fish Biomass	Towards	Towards	Towards	Towards	Towards	Towards
Comp: Main channel resident	Towards	Towards	Towards	Towards	Towards	Towards
Comp: Main channel spawner	Towards	Towards	Towards	Towards	Towards	Towards
Floodplain spawner (grey)			Towards	Towards	Towards	Towards
Floodplain resident (black fish)			Towards	Towards	Towards	Towards
Anadromous			Towards	Towards	Towards	
Comp: Anadromous			Towards	Towards	Towards	
Catadromous				Towards	Towards	Towards

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EXAMPLES OF RESULTS

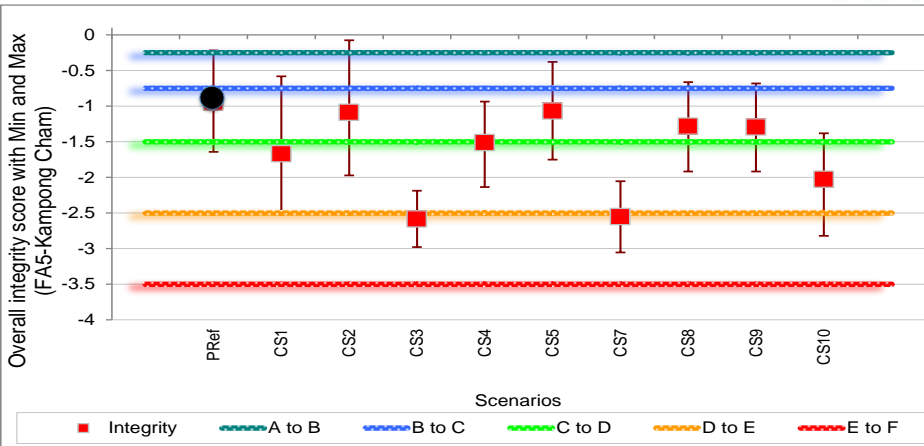


Overall Integrity predictions for FA1



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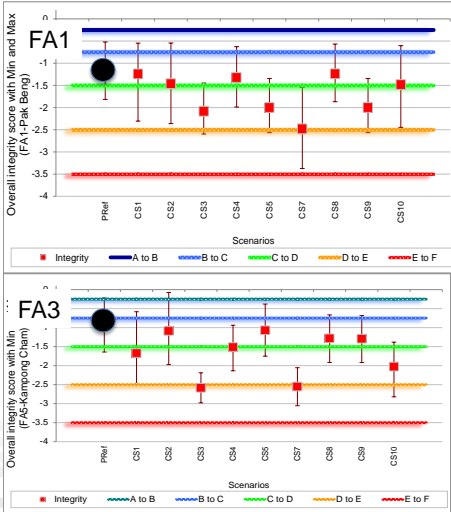
Overall Integrity predictions for FA5



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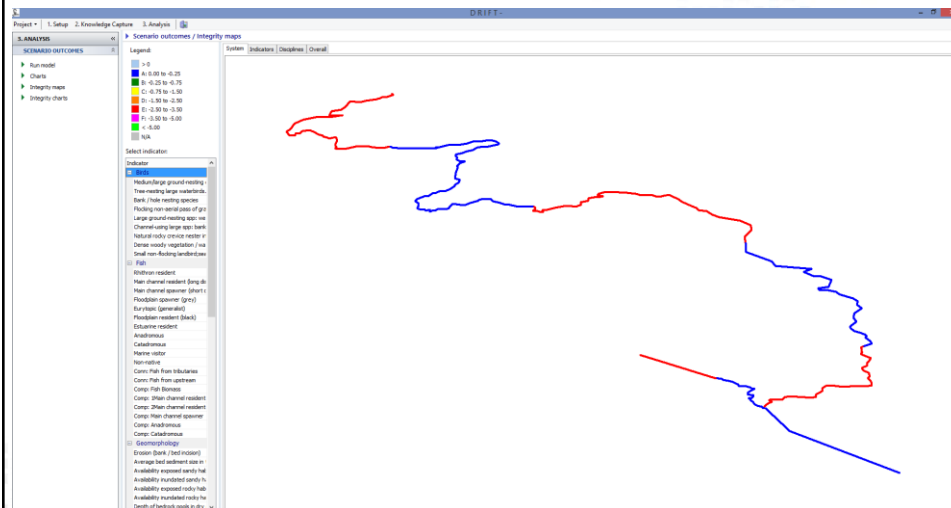
Comparison FA1 and FA5



- CS 1 – low wet, high dry:
 - no change at FA1
 - Improvement at FA3
- CS 2, 3, 4:
 - similar outcomes
- CS 5 – barrier FA1/FA2:
 - large change at FA1
 - no change at FA3
 - CS4 and 10 – sediment loss. Sand dominated habitat.

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Spatial depiction for a scenario

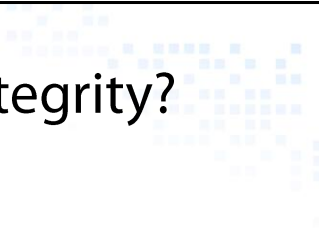



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INTERROGATING RESULTS

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What is driving integrity?

For a scenario:

- Check which discipline and indicators used
- Check weights
- Check overall scores
- Identify which indicator(s) are driving integrity score
- Allie to go through examples

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Thank You



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