Overview of Results from the EU-WETwin Project

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9th INTECOL International Wetlands Conference

Objectives of WETwin

"Enhancing the role of wetlands in IWRM for twinned river basins in EU, Africa and Latin-America in support of EU Water Initiatives"

Strategies for:

- **utilizing provisioning and regulating services, while maintaining ecosystem functions**
- **integrating wetlands into RBM**
- **adapting wetland management to changing environmental conditions**

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The Consortium

EU partners:

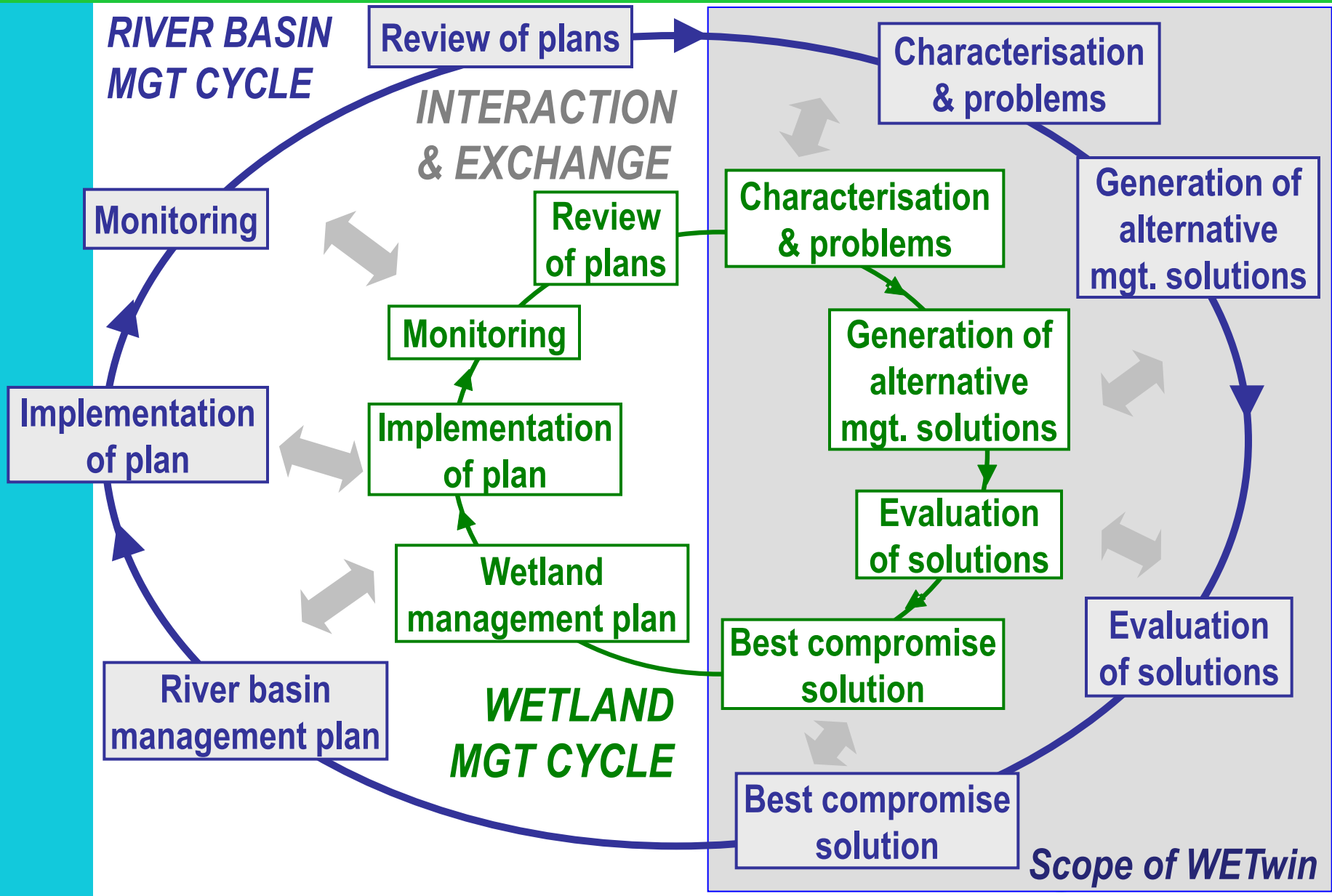
Non-EU partners:

'Twinning' partnership

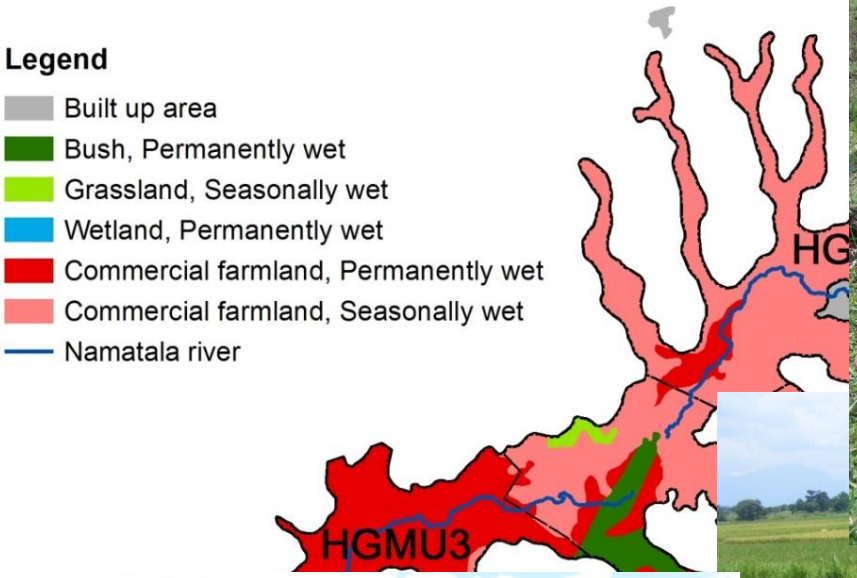
Prepared under contract from the European Commission

Working on case studies

Conceptual Framework



The Namatala wetland



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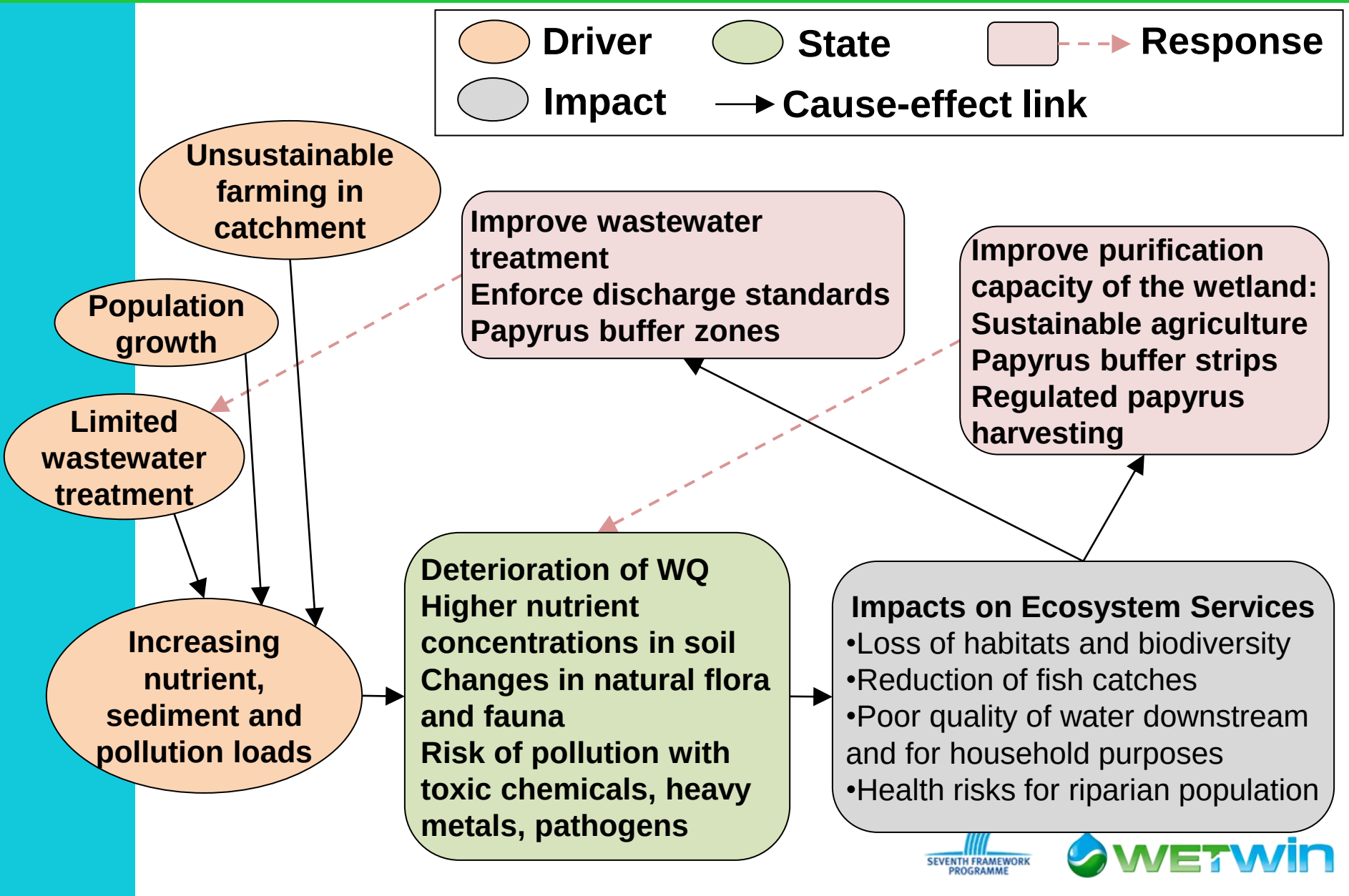
Characterisation, problems



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Generation of alternative mgt. solutions

Subjective process →

Objective Process →

				Management Solution 1	Management Solution 2	Management Solution 3
DSIR	Management Response A	Management Option A.1	Alternative A.1.1	X		
			Alternative A.1.2		X	
			Alternative A.1.3			X
		Management Option A.2	Alternative A.2.1	X	X	
			Alternative A.2.2			X
	Management Response C					
	Management Response D	Management Option D.1	Alternative D.1.1	x		X

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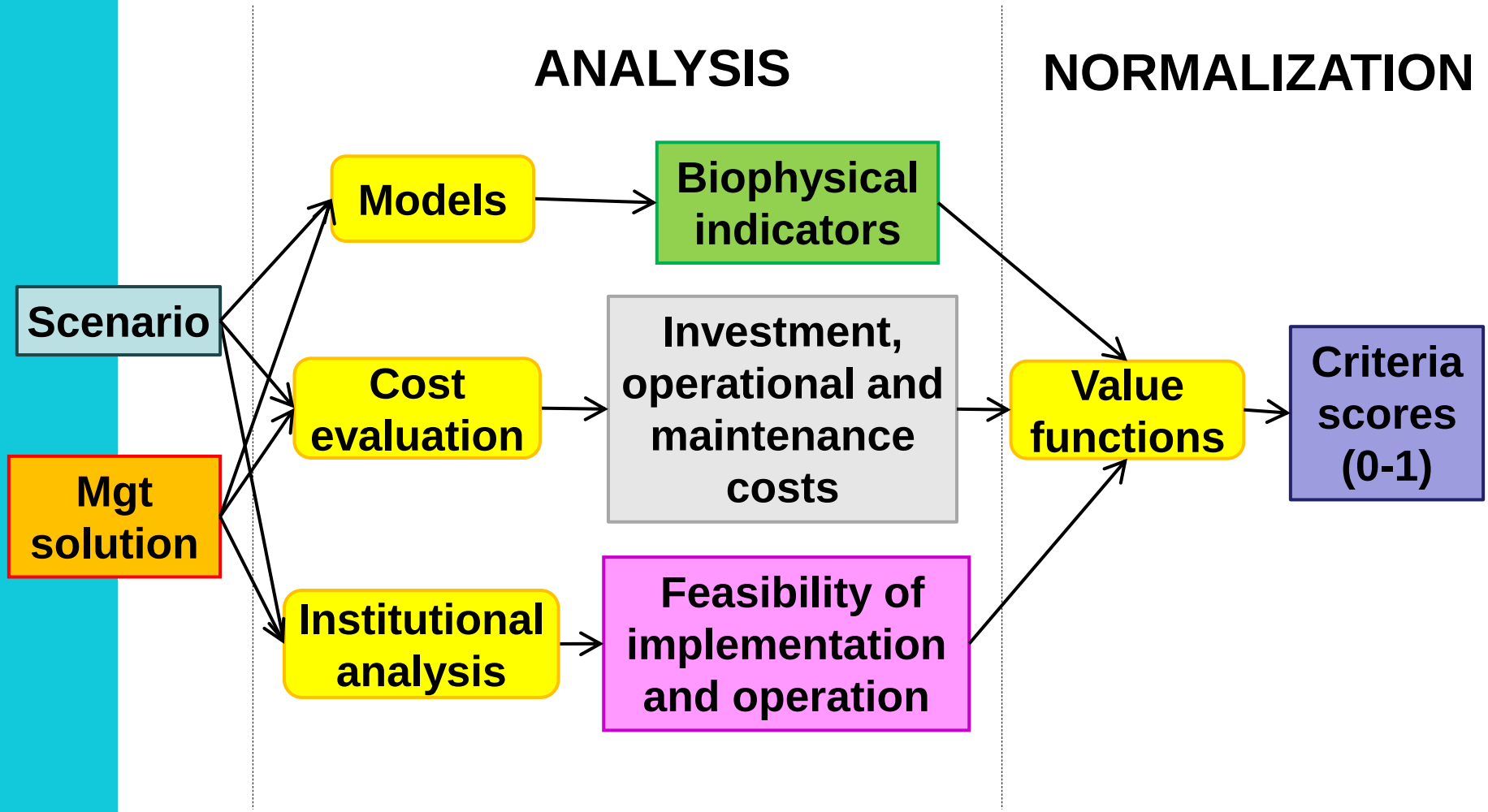
Evaluation of solutions



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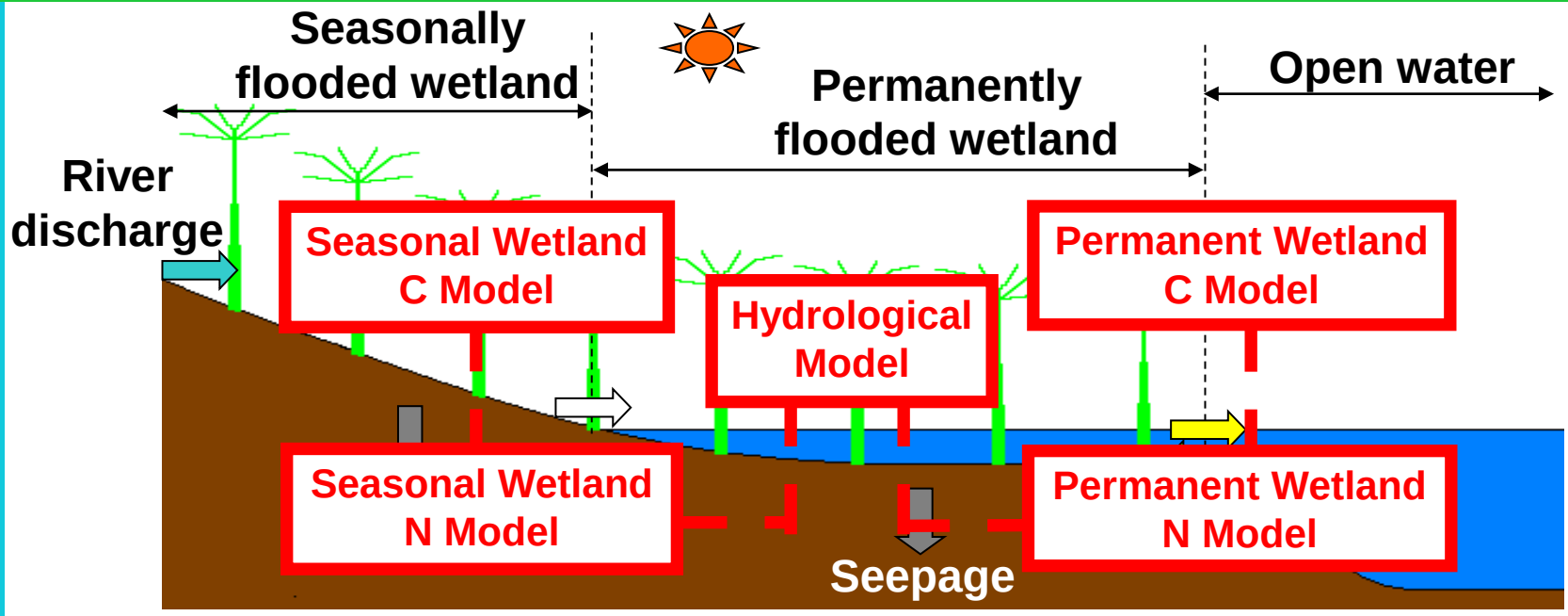
Wetland model of Hes et al.

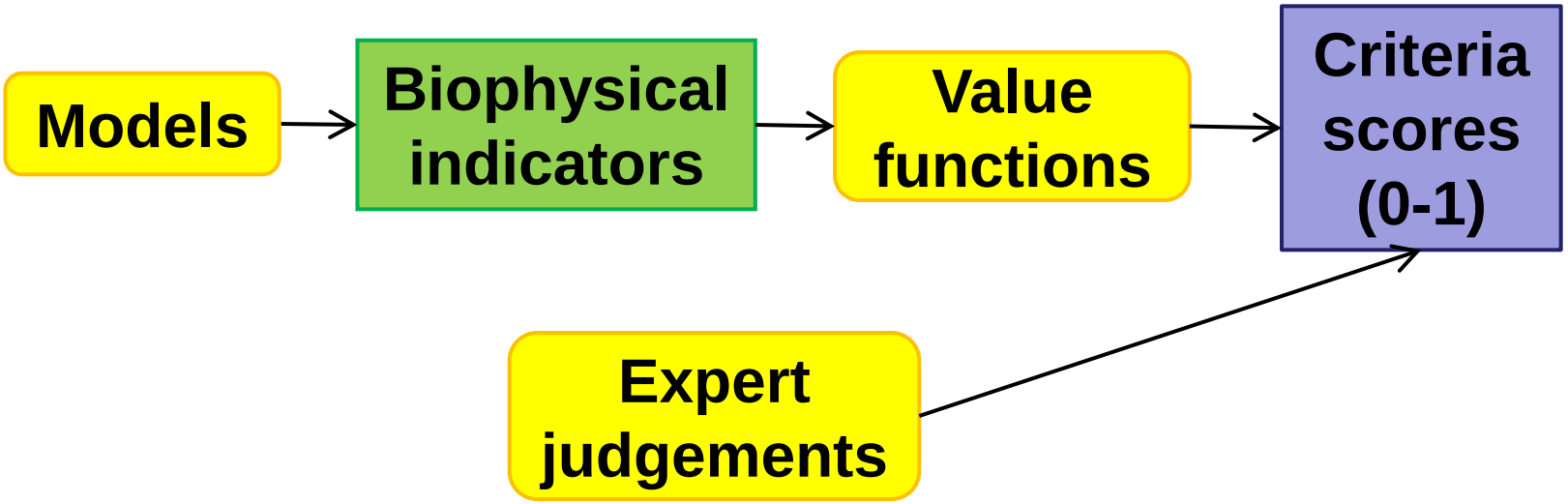


	0%	10% D	10% HBD	10% LBD	20% D	20% HBD	20% LBD	30% D	30% HBD	30% LBD
S	25	26	35	27	26	35	27	27	35	27
P	29	30	49	46	30	56	53	31	56	54
S+P	46	47	65	59	47	69	64	48	70	65

S = Seasonally flooded
P = Permanently flooded

D = Daily harvest
HBD = Batch harvest at High Biomass Density
LBD = Batch harvest at Low Biomass Density

Cooping with data poor conditions



WET-Health (Macfarlane et al., 2008)

WET-Ecoservices (Kotze et al., 2009)

Evaluation matrix, Namatala

					Management Solutions					
					Business As Usual (Agr. Encroach.)	Water Quality (low effort)	Water Quality (high effort)	Land Use Mgmt (low effort)	Land Use Mgmt (high effort)	Integrated Mgmt
Category	N°	Indicators		Actual State	MS 0	MS 1a	MS 1b	MS 2a	MS 2b	MS 3
Livelihood	1	Total rice production in wetland (t/y)		24 000	45 000	45 000	45 000	24 000	12 000	7 000
	2	Total fish production in wetland (t/y)		35	7	7	7	35	42	42
	3	Total production of papyrus biomass (t/y)		461	45	82	82	461	625	625
Human Health	4	disease risk (water-born diseases)		medium	high	medium	low	medium	medium	low
Ecology	5	Area of Papyrus wetland		2 000	200	200	200	2 000	3 200	3 200
	6	Area of Papyrus Buffer Strips		0	0	0	18	18	18	18
	7	Downstream Water Quality	Suspended Solids	46,0	100,0	100,0	100,0	36,8	29,9	23,0
			Nitrogen	0,2	0,2	0,2	0,2	0,2	0,2	0,2
			Phosphorus	0,3	0,5	0,5	0,5	0,25	0,20	0,15
	8	Nutrient removal by rice (t/y)		272	509	509	509	272	136	80
	9	Nutrient removal by papyrus (t/y)		4,2	0,5	0,8	0,8	4,2	5,7	5,7
Costs	10	Investment WWTP		no	no	low	medium	no	no	high
	11	Cost of training of communities		no	no	high	high	high	high	high
	12	Cost of awareness campaign		no	no	no	no	no	high	high
Risk of failure	13	Risk of technical failure		low	low	medium	medium	low	low	medium
	14	Risk of non-acceptance by community		low	low	low	low	medium	high	high
	15	Lack of institutional capacity		unlikely	unlikely	unlikely	possibly	possibly	likely	likely

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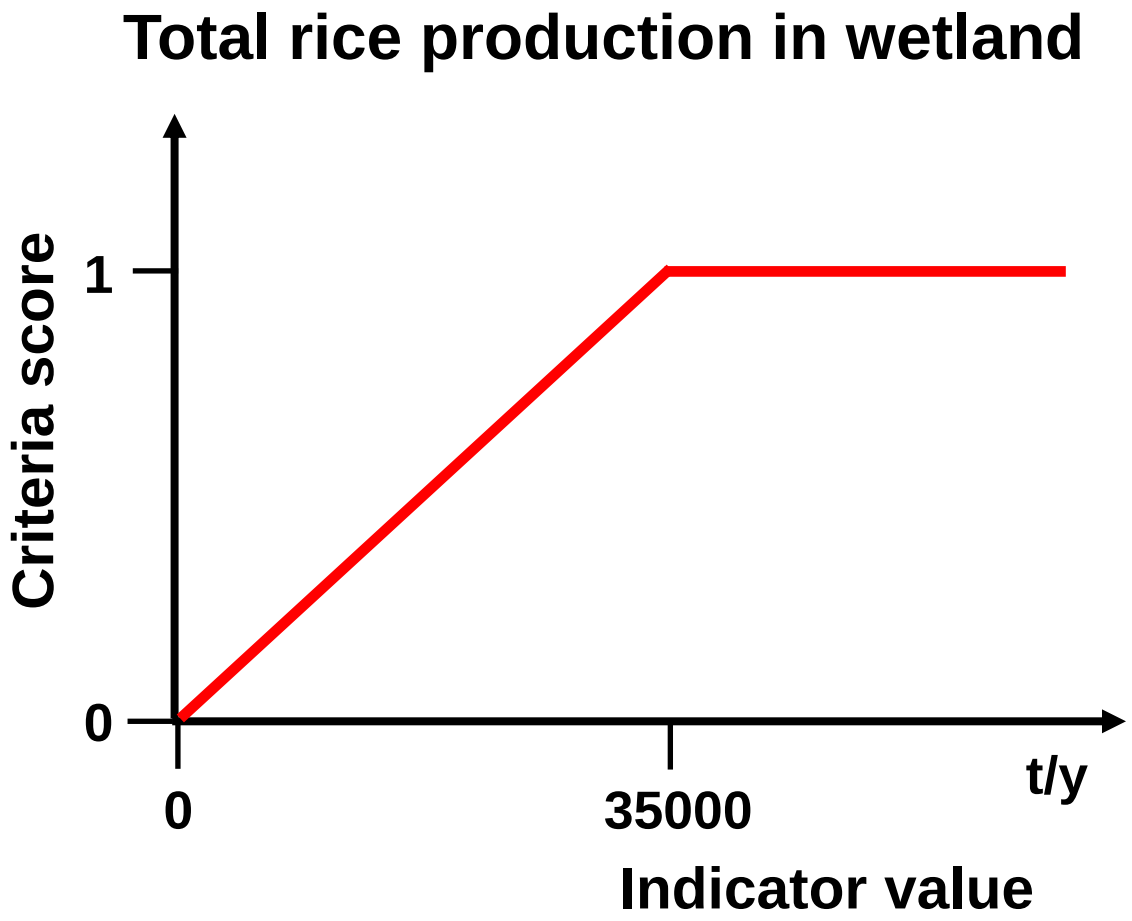
Value functions



Analysis matrix, Namatala

				Management Solutions					
				Business As Usual (Agr. Encroach.)	Water Quality (low effort)	Water Quality (high effort)	Land Use Mgmt (low effort)	Land Use Mgmt (high effort)	Integrated Mgmt
Category	N°	Criteria	Actual State	MS 0	MS 1a	MS 1b	MS 2a	MS 2b	MS 3
Impact Categories									
Livelihood	1	Total rice production in wetland	0,7	1,0	1,0	1,0	0,7	0,4	0,2
	2	Total fish production in wetland	0,9	0,2	0,2	0,2	0,9	1,0	1,0
	3	Total production of papyrus biomass	0,9	0,1	0,2	0,2	0,9	1,0	1,0
Human Health	4	disease risk (water-born diseases)	0,5	0,0	0,5	1,0	0,5	0,5	1,0
Ecology	5	Area of Papyrus wetland	1,0	0,0	0,0	0,0	1,0	1,0	1,0
	6	Area of Papyrus Buffer Strips	0,0	0,0	0,0	1,0	1,0	1,0	1,0
	7	Downstream Water Quality (SS, N, P)	1,0	0,8	0,8	0,8	1,0	1,0	1,0
	8	Nutrient removal by rice	0,5	0,9	0,9	0,9	0,5	0,3	0,2
	9	Nutrient removal by papyrus	0,3	0,1	0,1	0,1	0,3	0,3	0,3
Feasibility Categories									
Costs	10	Investment WWTP	1,0	1,0	1,0	0,5	1,0	1,0	0,0
	11	Cost of training of communities	1,0	1,0	0,0	0,0	0,0	0,0	0,0
	12	Cost of awareness campaign	1,0	1,0	1,0	1,0	1,0	0,0	0,0
Risk of failure	13	Risk of technical failure	1,0	1,0	0,5	0,5	1,0	1,0	0,5
	14	Risk of non-acceptance by community	1,0	1,0	1,0	1,0	0,5	0,0	0,0
	15	Lack of institutional capacity	1,0	1,0	1,0	0,5	0,5	0,0	0,0

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Articulation of stakeholders' preferences

Weight sets for Namatala

			a	b	c	d	e	f	g	h
			Equal share	Expert Weighting	Stakeholder group: Water Managers	Stakeholder group: Resource Users	Stakeholder group: Political Leaders	Stakeholder group: Environmentalists	Stakeholder group: Civil Society	Stakeholder group: Community Services
		LIVELIHOOD	**20,0%**	**25,00%**	17,00%	27,00%	19,00%	25,00%	25,00%	25,00%
Livelihood	1	Total rice production in wetland (t/y)	0,33	0,50	0,33	0,33	0,33	0,33	0,33	0,33
	2	Total fish production in wetland (t/y)	0,33	0,20	0,33	0,33	0,33	0,33	0,33	0,33
	3	Total production of papyrus biomass (t/y)	0,33	0,30	0,33	0,33	0,33	0,33	0,33	0,33
		HUMAN HEALTH	**20,0%**	**10,00%**	21,00%	18,00%	20,00%	19,00%	25,00%	15,00%
Human Health	4	disease risk (water-born diseases)	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00
		ECOLOGY	**20,0%**	**25,0%**	27,00%	32,00%	26,00%	28,00%	25,00%	27,00%
Ecology	5	Area of Papyrus wetland	0,25	0,30	0,25	0,25	0,25	0,25	0,25	0,25
	6	Area of Papyrus Buffer Strips	0,25	0,10	0,25	0,25	0,25	0,25	0,25	0,25
	7	Downstream Water Quality (SS, N, P)	0,25	0,20	0,25	0,25	0,25	0,25	0,25	0,25
	8	Nutrient removal by rice (t/y)	0,25	0,25	0,25	0,25	0,25	0,25	0,25	0,25
	9	Nutrient removal by papyrus (t/y)	0,25	0,15	0,25	0,25	0,25	0,25	0,25	0,25
		COSTS	**20,0%**	**15,0%**	18,00%	5,00%	18,00%	10,00%	8,00%	15,00%
Costs	10	Investment WWTP	0,33	0,33	0,33	0,33	0,33	0,33	0,33	0,33
	11	Cost of training of communities	0,33	0,33	0,33	0,33	0,33	0,33	0,33	0,33
	12	Cost of awareness campaign	0,33	0,33	0,33	0,33	0,33	0,33	0,33	0,33
		RISK OF FAILURE	**20,0%**	**25,0%**	17,00%	18,00%	17,00%	18,00%	17,00%	18,00%
Risk of failure	13	Risk of technical failure	0,33	0,25	0,33	0,33	0,33	0,33	0,33	0,33
	14	Risk of non-acceptance by community	0,33	0,35	0,33	0,33	0,33	0,33	0,33	0,33
	15	Lack of institutional capacity	0,33	0,40	0,33	0,33	0,33	0,33	0,33	0,33
			100,00%	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%

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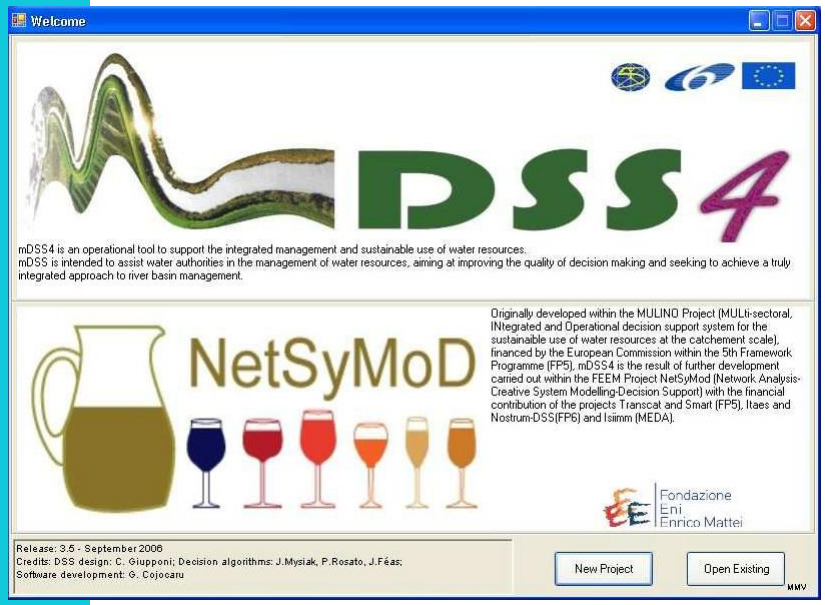
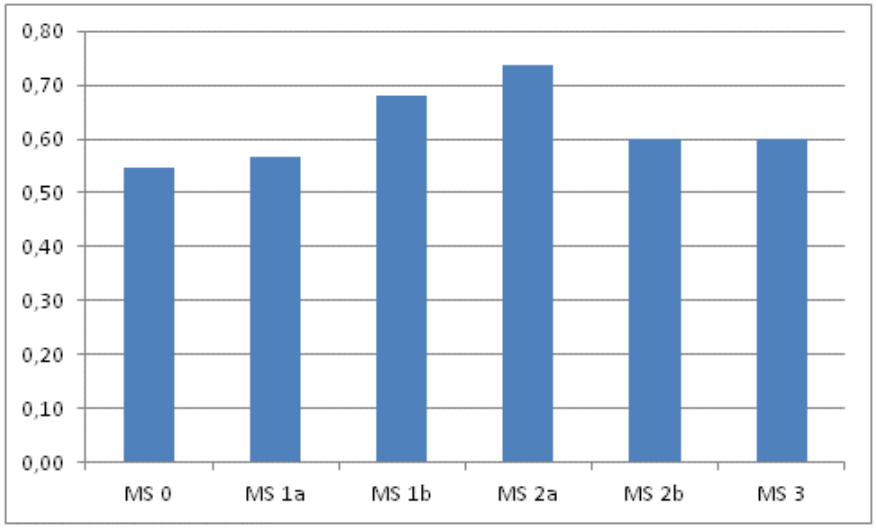
Identification of the best compromise solution

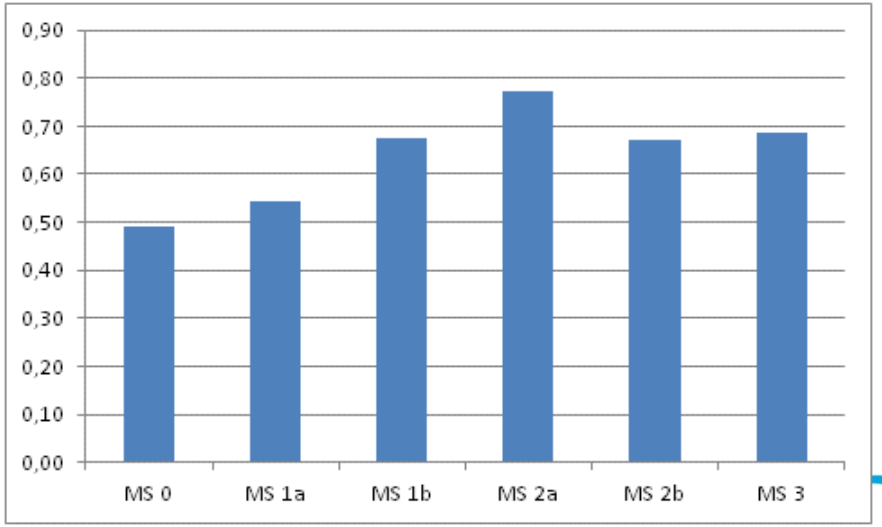
mDSS (Guipponi, 2007)



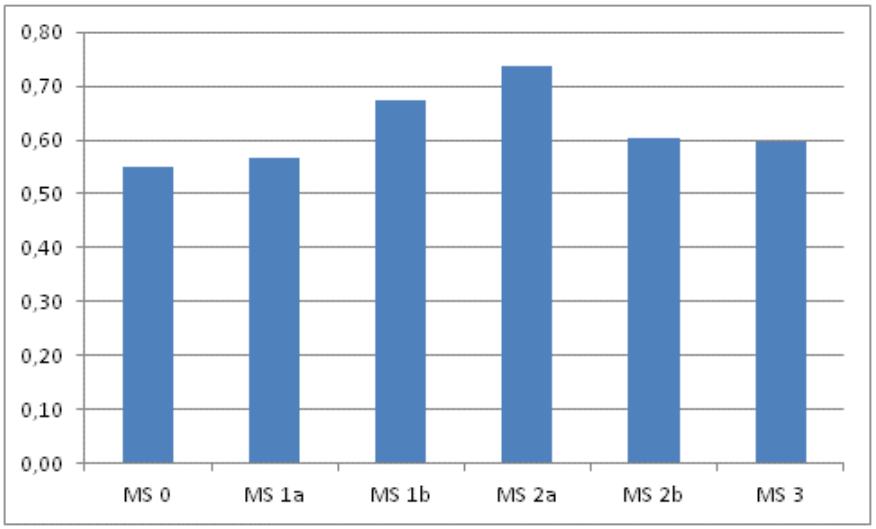
Stakeholder group: Water Managers



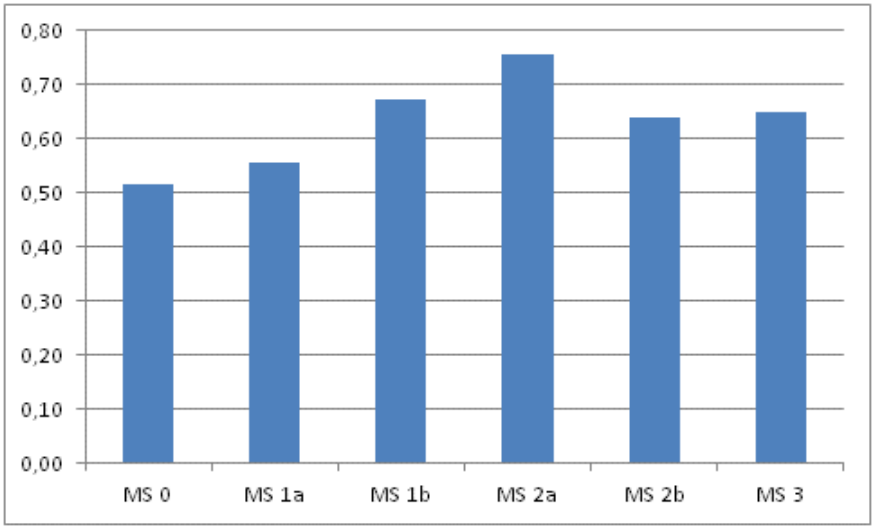
Stakeholder group: Resource Users



Stakeholder group: Political leaders



Stakeholder group: Environmentalists



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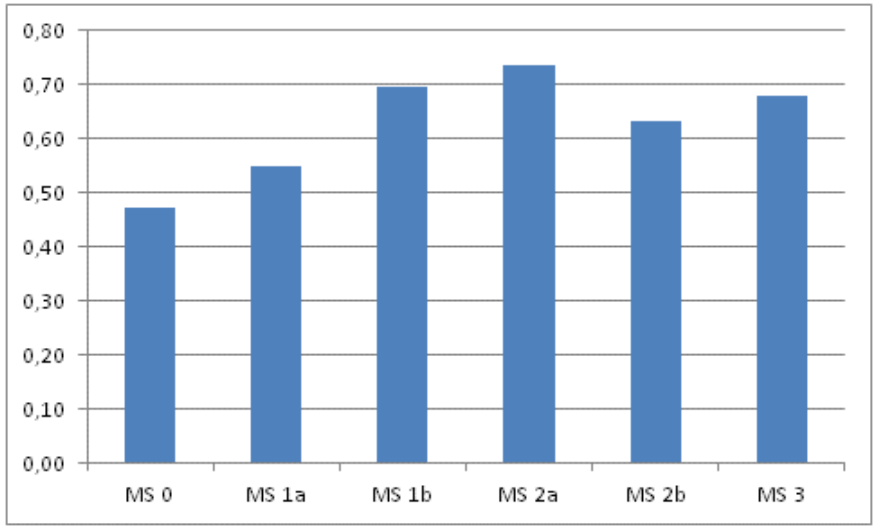
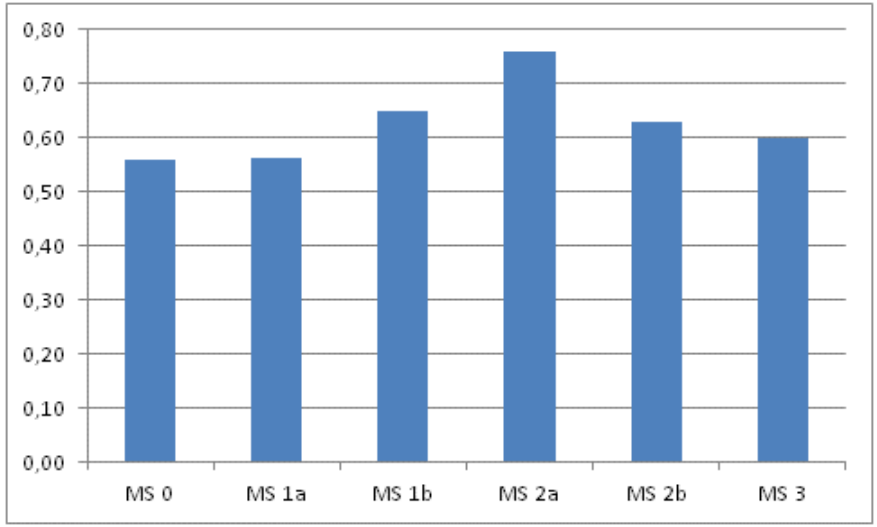
Stakeholder group: Civil Society



Stakeholder group: Community Services



Best compromise solution: MS 2a

- Papyrus buffer strips
- Papyrus buffer zones
- Papyrus harvesting regime
- Strict enforcement of wetland and land ownership policy
- Awareness campaigns

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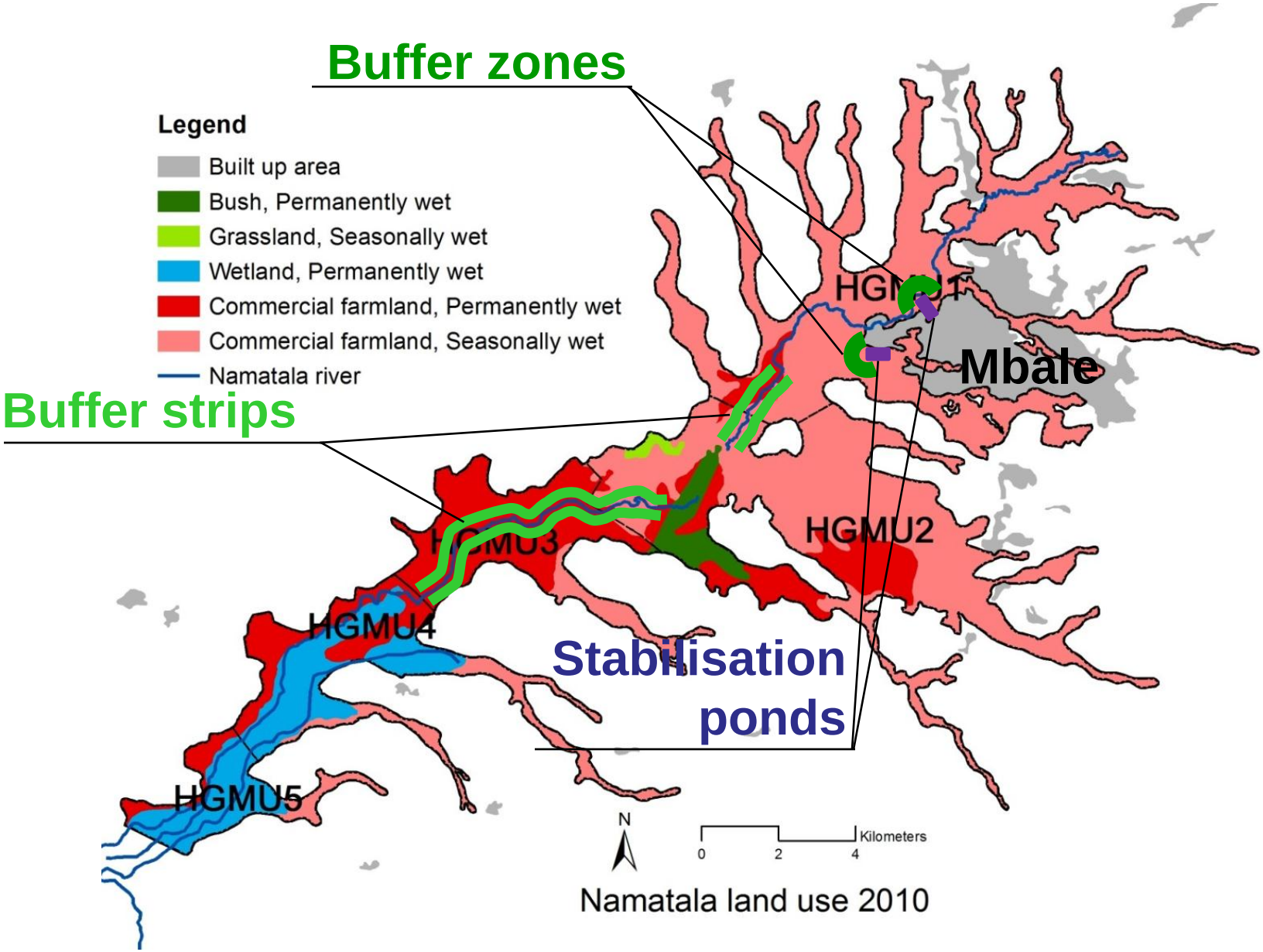
Buffer zones
Legend
Built up area
Bush, Permanently wet
Grassland, Seasonally wet
Wetland, Permanently wet
Commercial farmland, Permanently wet
Commercial farmland, Seasonally wet
Namatala river
Buffer strips
HGMU1
Mbale
HGMU2
HGMU3
HGMU4
HGMU5
Stabilisation ponds
N
0
2
4
Kilometers
Namatala land use 2010

Vulnerability Assessment

EI **: external impact**

$$EI = State_{(BAU)} - State_{(current)}$$

AC **: Adaptive capacity**

$$AC = State_{(mgt)} - State_{(BAU)}$$

ΔV **: change in vulnerability**

$$\Delta V = EI + AC$$
$$\Delta V = State_{(mgt)} - State_{(current)}$$

ΔV**>0: the system moves towards a resilient state**
ΔV**<0 : the system moves towards a more vulnerable state**

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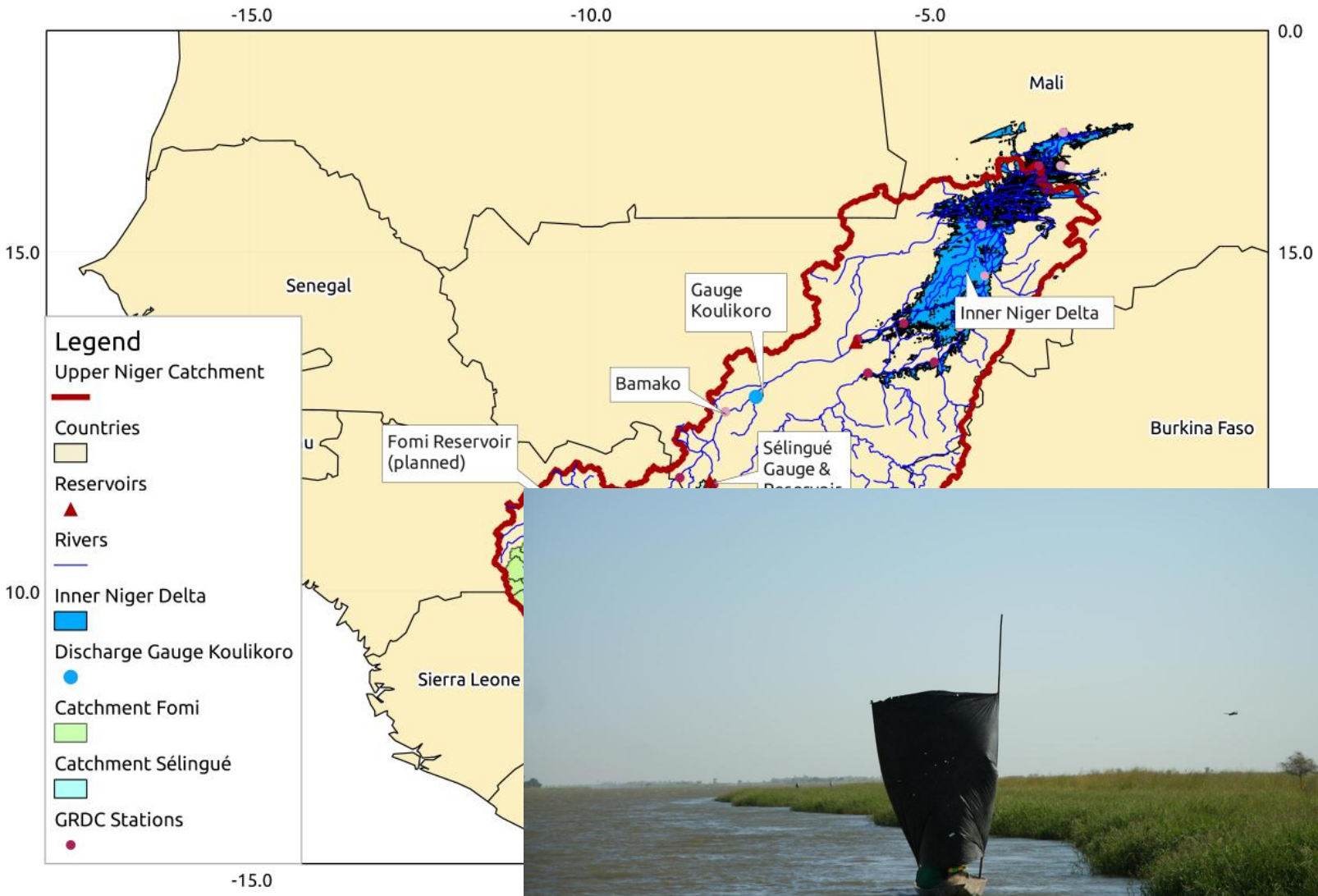
Vulnerability of food production in the Inner Niger Delta



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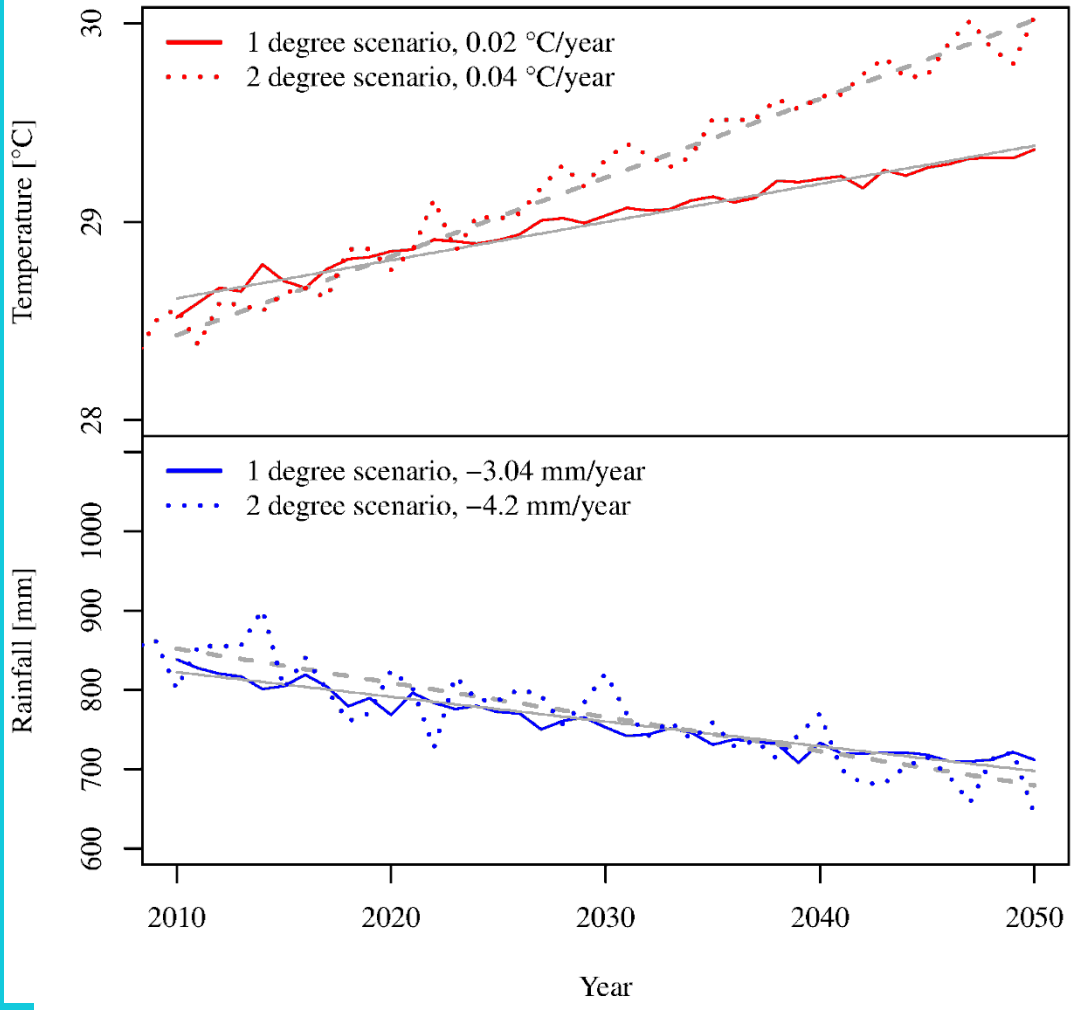
Scenarios



Population growth scenarios: 0.7% and 2.6% annual growth rates

Water management scenarios: 1. Sélingué reservoir; 2. Sélingué and Fomi reservoirs

Management

Additional 65,000 ha of wetland area will gradually be converted into rice fields with a productivity of approximately 5 t/ha.

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Estimated values of vulnerability components (rice production)

Scenario	EI	$State_{(BAU)}$	AC	$State_{(mgt)}$	ΔV
Current state = 0.6					
0℃, Pop 1, Seli	-0.350	0.250	0.750	1.000	0.400
0℃, Pop 1, Seli&Fomi	-0.300	0.300	0.700	1.000	0.400
0℃, Pop 2, Seli	-0.575	0.025	0.350	0.375	-0.225
0℃, Pop 2, Seli&Fomi	-0.550	0.050	0.420	0.425	-0.130
1℃, Pop 1, Seli	-0.300	0.300	0.700	1.000	0.400
1℃, Pop 1, Seli&Fomi	-0.600	0.000	1.000	1.000	0.400
1℃, Pop 2, Seli	-0.525	0.075	0.050	0.125	-0.475
1℃, Pop 2, Seli&Fomi	-0.600	0.000	0.200	0.200	-0.400
2℃, Pop 1, Seli	-0.575	0.025	0.575	0.600	0.000
2℃, Pop 1, Seli&Fomi	-0.600	0.000	0.525	0.525	-0.075
2℃, Pop 2, Seli	-0.600	0.000	0.025	0.025	-0.575
2℃, Pop 2, Seli&Fomi	-0.600	0.000	0.050	0.050	-0.550

Thank you!

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