Resilience of (in) the SEA process: evidence from Sensitivity Analysis

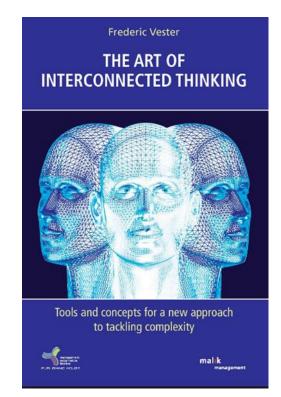


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Sensitivity analysis

how different parts interact

differentially affect output (EI)



ranges of input for which output max or min

process sensitivity = response to change

Self-regulation – circular logic - cybernetics



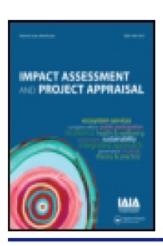
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Enhancing environmental integration in strategic environmental assessment (SEA): insight from sensitivity analysis

Vincent Onyango^a



Impact Assessment and Project Appraisal



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Exploring the strategic environmental assessment (SEA) process behaviour using sensitivity analysis

"system" (Hall and Fagan 1956).

structured functional unit

holistic + interdependent + interacting parts

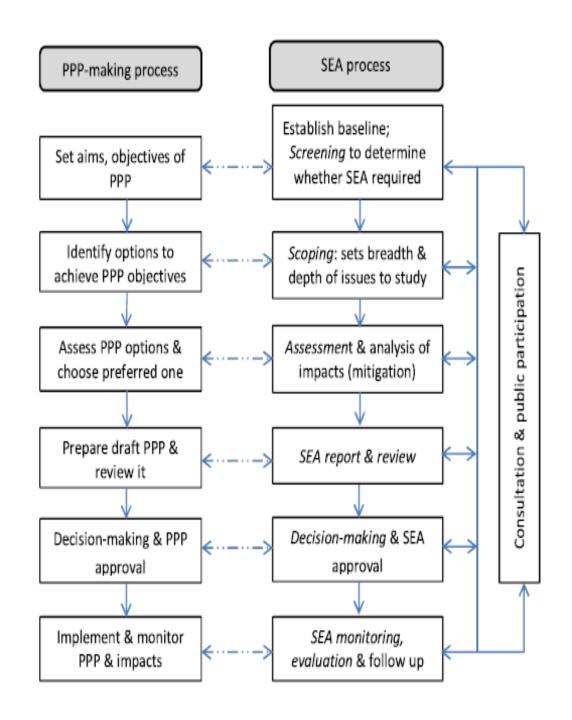
parts of other systems

Interdependence / inter-relations (complexity)

Underlying assumptions...

SEA process:

- Systematic
- Complex
- Iterative, flexible, adaptable
- Feedbacks
- Goal = EI



Research questions

Extent SEA process self-regulating?

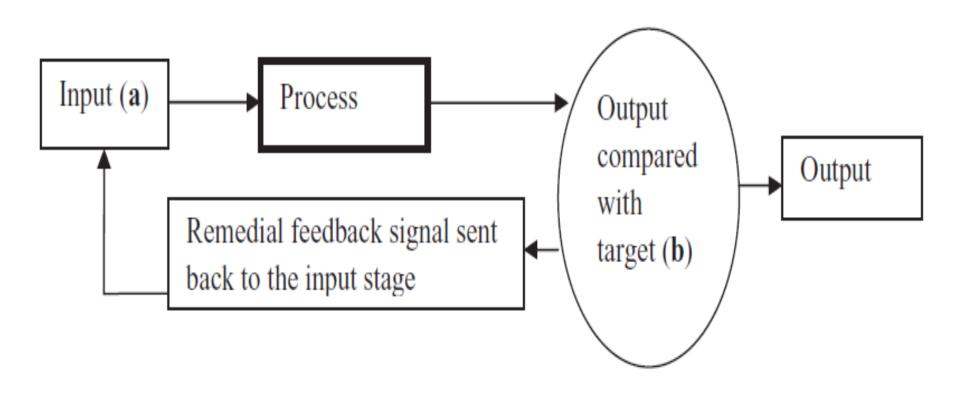
- Evidence?

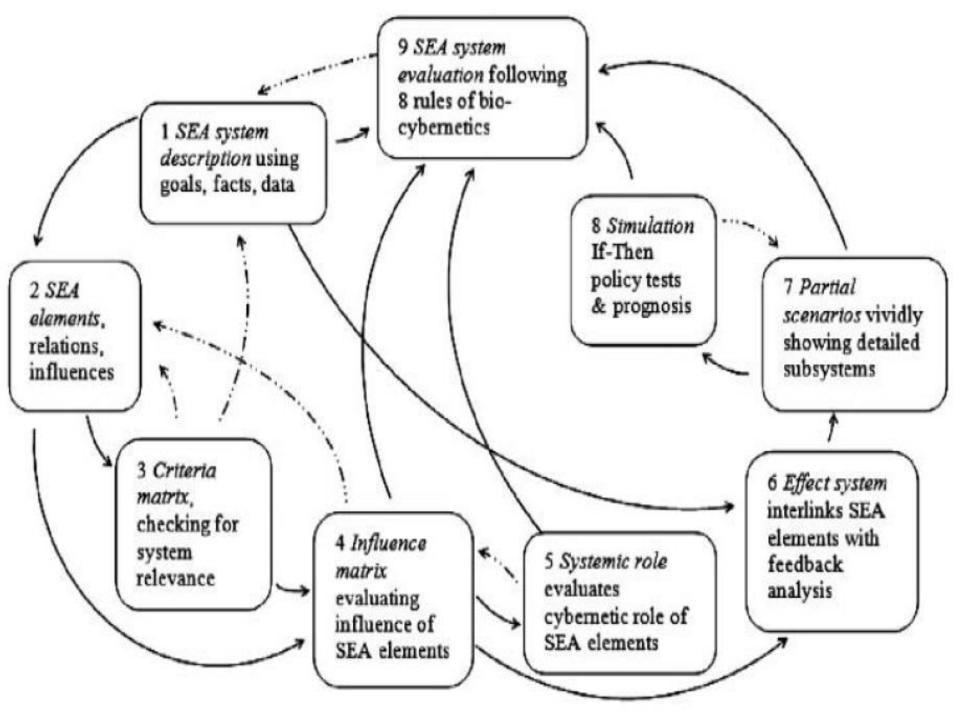
– What characteristics?

Hypothesis:

- more self-regulation
- = more resilient

Self-regulation





	Influence by _♦ to →	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	AS	Р
1	Scoping	Х	3	3	3	3	2	2	1	2	0	0	0	0	0	0	0	1	1	0	25	600
2	Environmental baseline	0	Χ	3	3	3	2	2	1	2	3	0	1	0	0	0	0	2	0	1	23	621
3	Predicting env. impacts	0	0	Х	3	3	3	3	3	2	3	1	1	0	0	0	0	0	0	1	24	696
4	Evaluating env. impacts	0	0	0	Х	2	3	3	3	2	3	1	0	0	0	0	2	0	0	0	19	570
5	Identifying PPP alternatives	0	0	1	1	Х	2	3	3	1	2	1	1	0	0	0	1	0	0	0	18	702
6	Evaluating PPP alternatives	0	0	0	0	0	Х	3	3	1	0	0	0	0	0	0	0	0	2	0	9	297
7	Mitigating impacts	0	0	0	0	0	0	Х	3	0	3	1	0	0	1	0	1	0	1	1	13	559
8	Decision-making & review	0	0	1	1	1	1	1	Χ	0	2	0	0	0	1	0	0	0	1	1	11	484
9	Public participation	3	2	2	1	1	1	1	2	Х	1	3	1	0	1	0	3	2	1	1	27	729
10	Monitoring & evaluation; SEA f	0	0	1	0	0	0	1	0	0	Х	1	0	0	1	0	2	3	0	1	13	481
11	Cultural aspects	2	2	1	1	1	1	2	3	2	1	Х	2	2	1	1	1	0	0	0	33	396
12	Env. & sustainability objectiv	0	3	2	3	3	3	2	2	0	2	0	X	0	0	0	1	2	0	1	25	375
13	SEA regulations, laws	2	2	1	1	1	1	1	1	2	3	0	1	Х	0	0	1	2	1	2	30	210
14	National / sector env. objecti	2	2	2	2	2	2	2	2	0	2	0	3	0	X	1	0	2	1	0	27	297
15	Environmental laws	2	2	1	1	2	2	3	1	2	1	1	0	1	2	Х	1	1	1	1	33	198
16	Public, civil society awarenes	2	2	2	2	2	2	2	3	3	2	3	1	1	1	1	Х	2	0	0	33	495
17	Quality control	3	3	2	2	2	2	2	2	1	1	0	0	0	0	0	0	X	2	0	25	675
18	SEA team	0	1	1	1	1	2	2	2	1	0	0	0	0	0	0	0	1	Х	1	17	221
Cor	sensus Compare with	24	27	23	30	33	33	43	44	27	37	12	15	7	11	6	15	27	13	19	PS	
} 	roup A Group A	104	85	83	63	46	27	30	25	100	35	275	167	429	245	550	220	93	131	84	Qx	100
Group B Group B																						
Group C Group C A Decision-making & review has no effect on Public participation																						

Key outputs

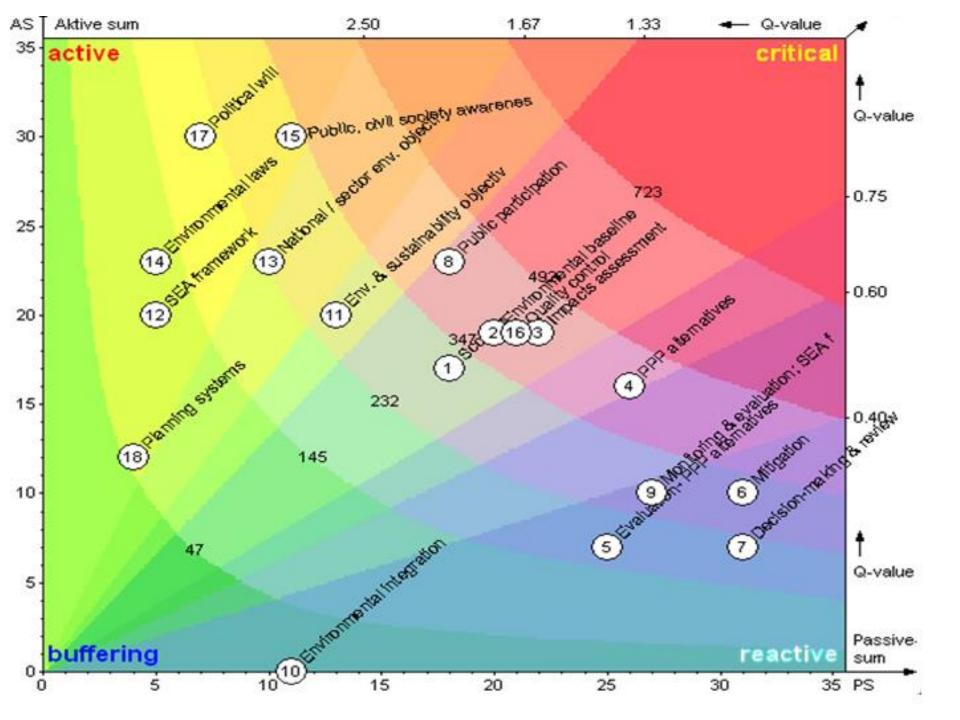
Resilience in structure and function

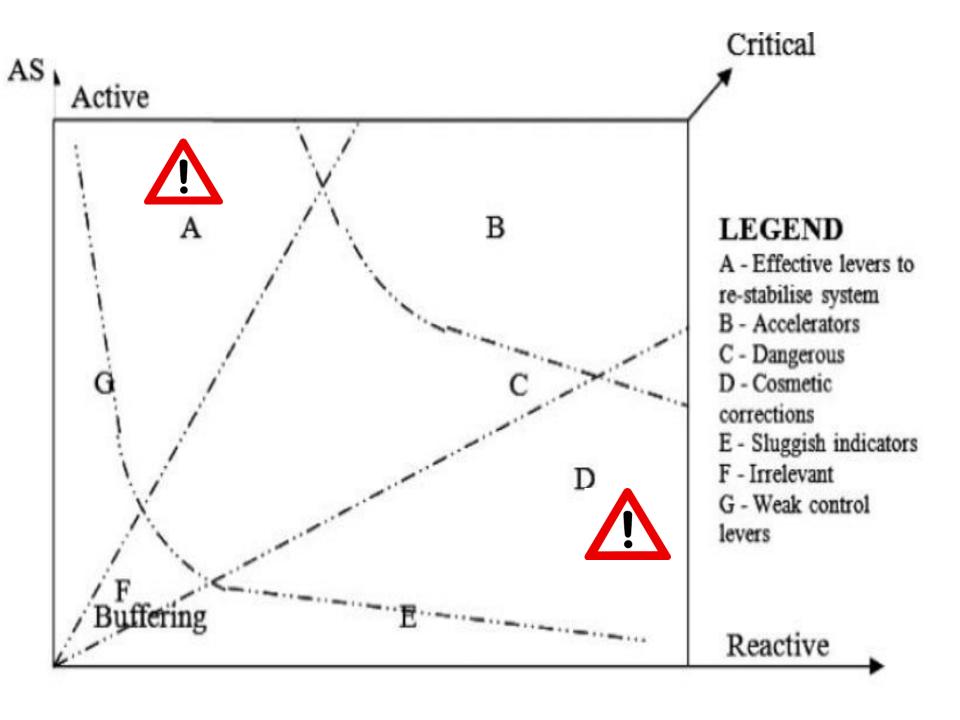
Blue-print / DNA of process

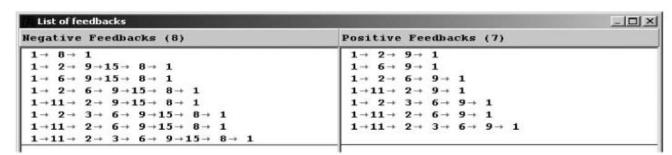
Systemic behaviour – not single SEA exercise



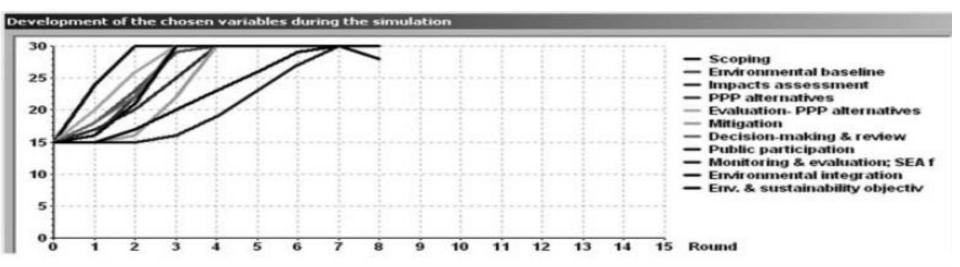
AKTIVE PASSIVE	Q-Value	CRITICAL BUFFERING	P-Value
HIGHLY ACTIVE	_	HIGHLY CRITICAL	_
14 Environmental laws	4.60	_	
17 Political will	4.29		
12 SEA framework	4.00	CRITICAL	
18 Planning systems	3.00	_	
15 Public, civil society awarenes	2.73		
		SLIGHTLY CRITICAL	
AKTIVE		3 Impacts assessment	418
13 National / sector env. objecti	2.30	4 PPP alternatives	416
		8 Public participation	414
SLIGHTLY ACTIVE		16 Quality control	399
11 Env. & sustainability objectiv	1.54	2 Environmental baseline	380
NEUTRAL		NEUTRAL	
8 Public participation	1.28	15 Public, civil society awarenes	330
2 Environmental baseline	0.95	6 Mitigation	310
1 Scoping	0.94	1 Scoping	306
16 Quality control	0.90	9 Monitoring & evaluation; SEA f	270
3 Impacts assessment	0.86	11 Env. & sustainability objectiv	260
- Inpute description		22 200 4 500 100 100 100 100 100 100 100 100 100	
SLIGHTLY PASSIVE		SLIGHTLY BUFFERING	
4 PPP alternatives	0.62	13 National / sector env. objecti	230
a iii amamama	0.02	7 Decision-making & review	217
PASSIVE		17 Political will	210
- ASSIVE	-		175
l -	_	5 Evaluation- FFF alternatives	173

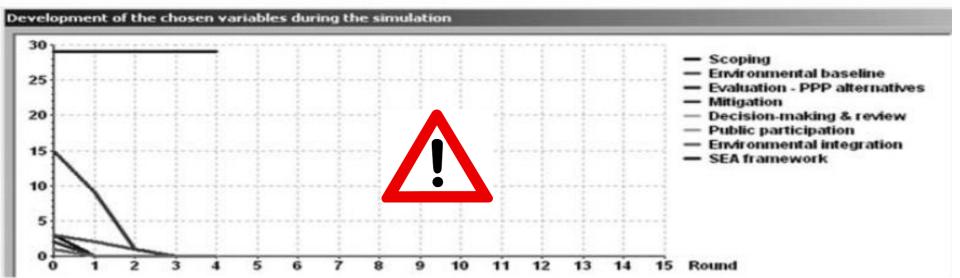




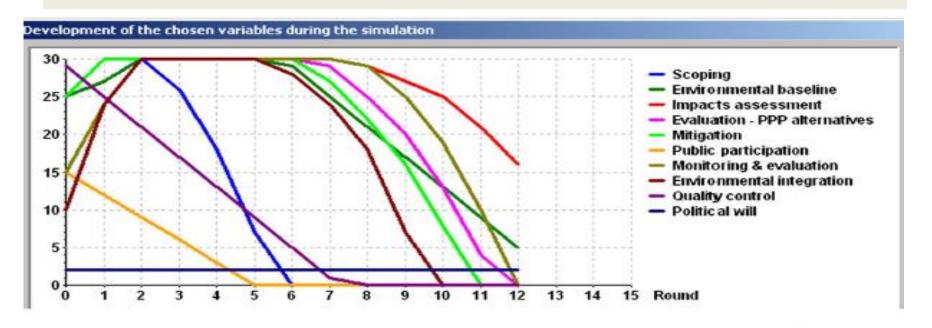


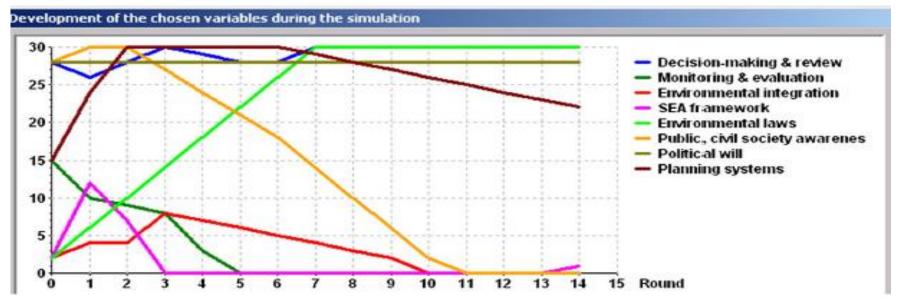




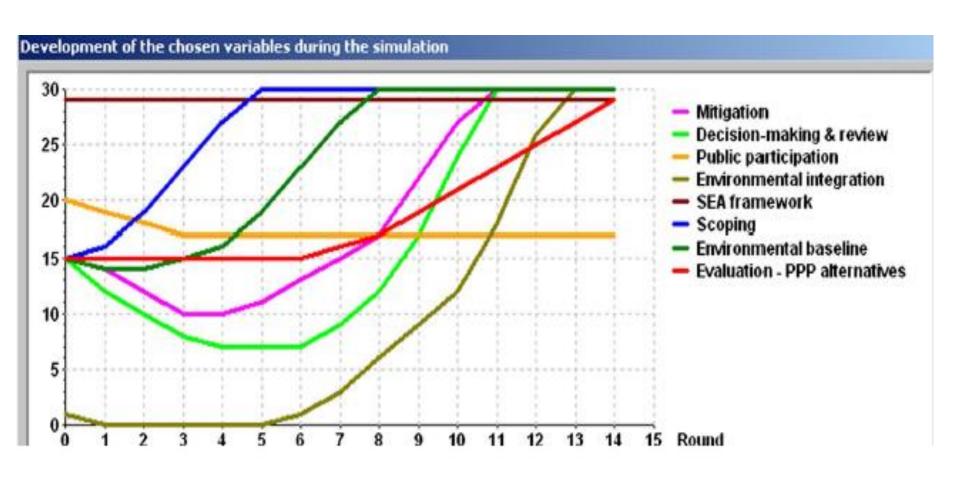


Thresholds + simultaneity (political will)





Compensatory effect (to slow!!)



Compensatory effect

- Equifinality = alternative ways to same objectives (convergence);
- Multifinality = alternative objectives from same inputs (divergence).
- key to 'complex adaptive system' (see Holland 2006)
 - adaptive learning
 - resilience

Research objectives	Findings from study						
How do SEA elements behave?	No 'highly critical' or 'critical' elements to steer process activities and output						
	 Five key behavioural characteristics of process elements 						
How does the process respond to change?	 Process is fairly stable, exhibits inertia Reacts slowly to change, has low capacity for self-regulation 						
	Heavily reliant on external factors						
	 Starting conditions are critical determinants of process 						

behaviour

What are the limitations and constraints in process response?

- Compensatory mechanisms take too long
- Threshold limits exist, above which certain effects are triggered