

SSA 18-Danube Delta Romanian-Bulgarian CZ Formulation Step

Systems Formulations

Fishery decline caused by habitat changes



Formulation Step ("... by step")

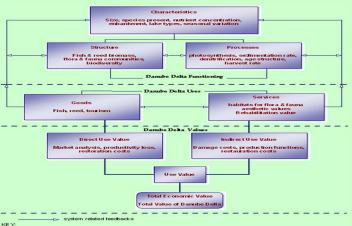
Selection of most relevant inputs, processes, internal interactions, functional components, scenarios



Components	Processes	Variables	Symbol	Dimension	Units
Phytoplaniton	light transmission	PAR, TSM	PAR, TSM	(E)/L/2*T	tE/m2/s
	Nutrient uptake	N.P	N.P	DCVL*3	un d/1
	Grazingrate	Zooplankton	Groo	[M]/[T]	mg/ind/day
	Mortality	Virus, bacteria, natural	М	[T]/(llscal)	osli/day
	Dominant species	phytopleniton			
Zooplankton	structure	Zooplankton			indi
	biomass	Zooplankton	Впоо	[M]/L	ngl
	Predation	Higher trophic levels	Oroni	[M]/[T]	ng/ind/day
Fish	Orazingrate	phytoplalton size and density	Gzoo	[M]/[T]	ngind/day
	Mortality	Batteria, natural	M	(ncell)(T)	cell/day
	predation	higher trophic levels	Offish	[M]/[T]	ngind/day
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Nutrients	Concentration	P, N	P. N	DMJ/L	ngt
Beathic ignertebrates	Predation by fish				
	Structure				

Use Matrix for CZ System Response to Human Influences

Influence Category	HA examples	Market Value	Natural System	Social Acceptance
Displacing resources	embankment	indirect val=f(economic from fish resources)	Damage=f(degree of sustainable management, restoration actions)	Balance f(sustainable market benefits), Balance f(sustainable nonmarket benefits, aestetics)
Adding substances to system	nutrient loads	direct benefit=f(effort saved)	Damage=f(loss of biodiversity, fish community shifts, ecosistem carrying capacity)	Balance= f(human and ecosistem health); Balance= f(sustainable market benefits)
Conserving or reducing impact	effective management actions	loss of benefit=f(resource removal from market)	Benefit-f(ecosystem quality; increase of market valued products)	Balance= f(ecosystem sustainabiliy)



scenarios that will be explored are:

1) Let things take their course- no change;

- The nutrient input is decreased and the Delta ecosystem is recovered- an increase of commercially important fish species;
- Measures for restoration of habitats devastated by embankments are taken- fish spawning areas are recovered;

Challenges: (i) what would be the cost benefit from fishing activities recovery; (ii) economic loss for agriculture (2), or reed harvesting (3), or of inactions (1)?; (ii) data quantity



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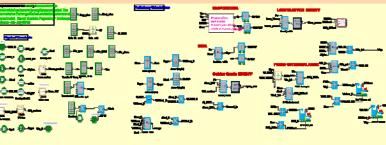
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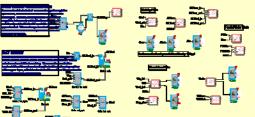
waters in Varna Bay

scenarios that will be explored are:

- Business as usual baseline scenario no change in the WWTP, current state of industry and economic incentives;
- Deep green (optimistic scenario) the Program for improvement of the WWTPs is fully implemented and the industrial input is decreased and the compliance with the WFD is fully reached;
- Realistic scenario The WWTPs program is partially implemented (50% reduction of the loads) and 50% reduction of the industrial loads (input from the lakes) respectively

Functional components





Ballpark model of Varna Bay

Challenges: (i) economic & social components; (ii) data quantity; (iii) What trade-offs and options would minimize conflicts of interests and the respective policy decisions?

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