

Case Study 7 – Annex

Biodiversity management for rivers of the Swiss Plateau[1]

[1] *See full case study report for author and project information. Further information at https://aquacross.eu/content/case-study-7-biodiversity-management-rivers-swiss-plateau*

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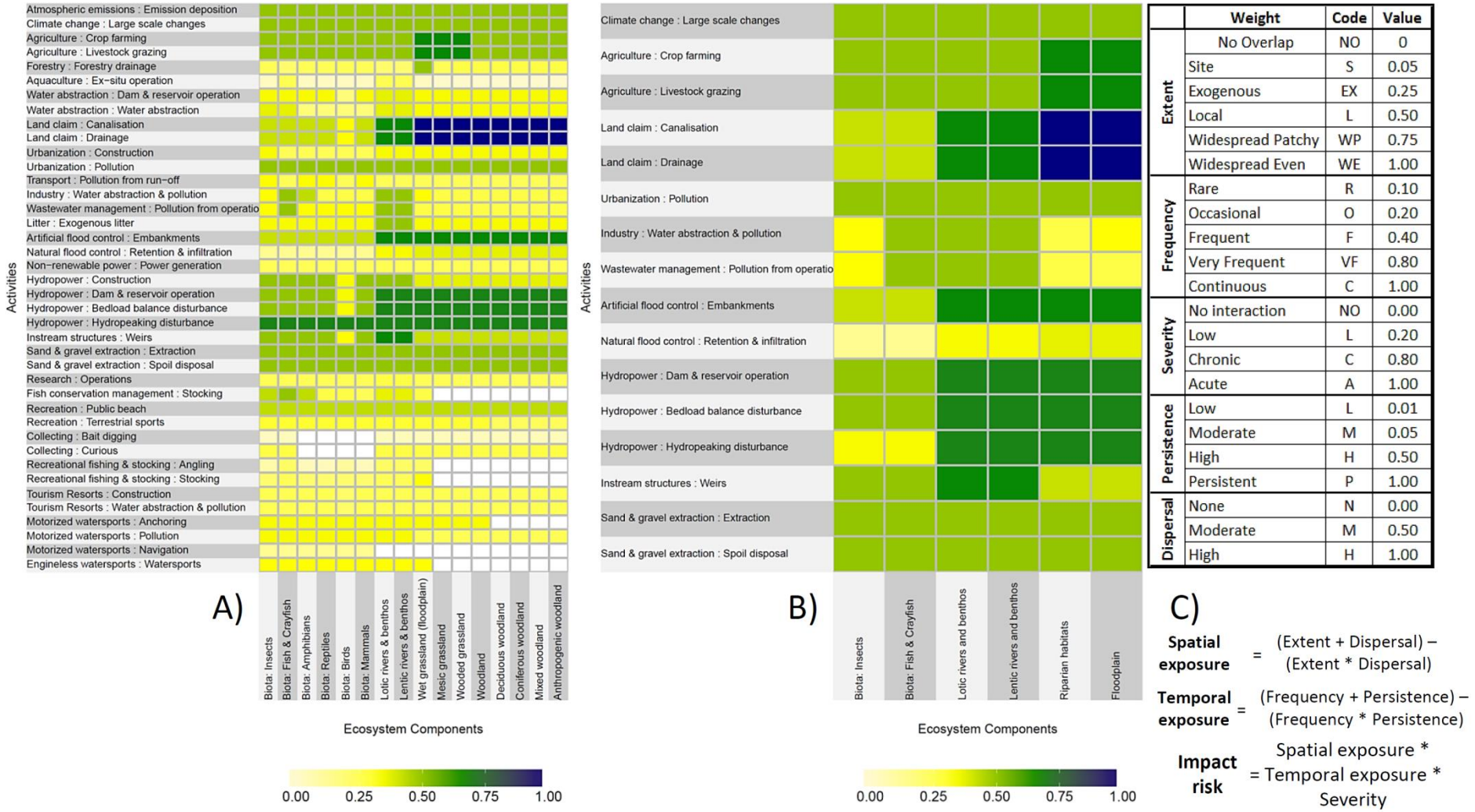
Annex 1



	Weight	Code	Value
Extent	No Overlap	NO	0
	Site	S	0.05
	Exogenous	EX	0.25
	Local	L	0.50
	Widespread Patchy	WP	0.75
	Widespread Even	WE	1.00
Frequency	Rare	R	0.10
	Occasional	O	0.20
	Frequent	F	0.40
	Very Frequent	VF	0.80
	Continuous	C	1.00
Severity	No interaction	NO	0.00
	Low	L	0.20
	Chronic	C	0.80
	Acute	A	1.00
Persistence	Low	L	0.01
	Moderate	M	0.05
	High	H	0.50
	Persistent	P	1.00
Dispersal	None	N	0.00
	Moderate	M	0.50
	High	H	1.00

C)

Spatial exposure = (Extent + Dispersal) – (Extent * Dispersal)

Temporal exposure = (Frequency + Persistence) – (Frequency * Persistence)

Impact risk = Spatial exposure * Temporal exposure * Severity

Fig. A1: Impact risk from all (A) and selected (B) of activities and their pressures identified in CS7 with assigned weights: Extent and Dispersal give an estimate of Spatial Exposure, whereas Frequency and Persistence one of Temporal exposure. Both combined with Severity yield the impact risk estimate (as given in C)

Annex 2

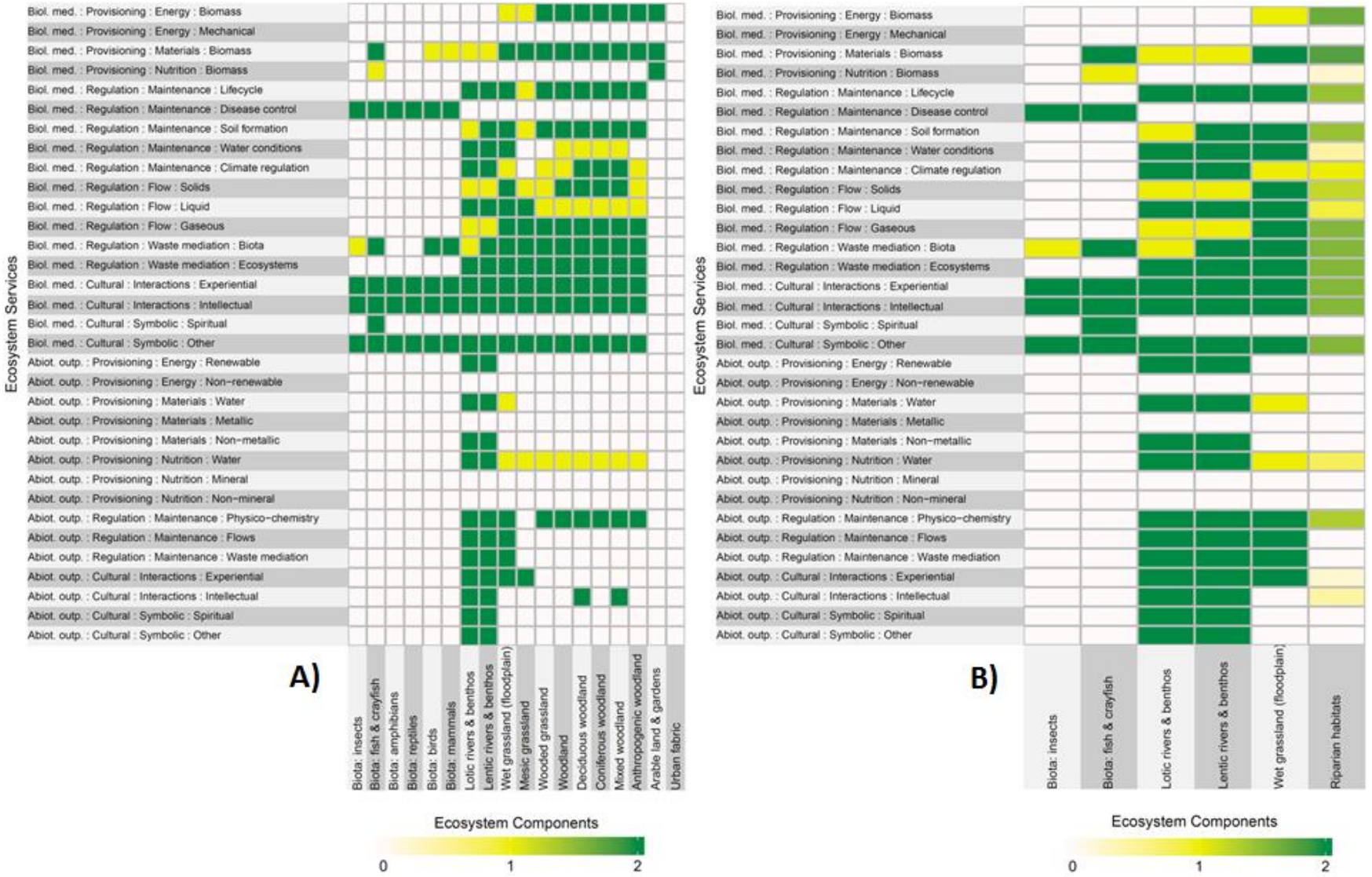


Fig. A2: Importance assigned to Ecosystem Services (both biologically mediated and abiotic outputs) for all (A) and for selected Ecosystem Components (B). Colours indicate relevance (white = none; yellow = moderate; green = high).

Fig. A3: Importance of Ecosystem Components for Ecosystem Function in the full CS7 system (A) and for selected Ecosystem Components (B). Colours indicate relevance (white = none; yellow = moderate; green = high).

Annex 3

The terminology used in the course of the AQUACROSS project was abbreviated for the purpose of this report. Here we deliver the equivalents in a table for comparison between case study reports.

Table A3.1: Primary Activities

Existing	**Implemented**
Agriculture (crops and livestock)	Agriculture
Forestry	Forestry
Ex-situ aquaculture	Aquaculture
Flood and coastal defence – Artificial Structures: including levees, dykes, embankments, sea walls/breakwaters/groynes	Artificial flood control
Flood and coastal protection – natural water retention and restoration	Natural flood control
Land claim and conversion (including construction and operation)	Land claim
Stocking and moving fish for conservation (including related ex situ aquaculture)	Fish conservation management
Transversal instream structures – (Weirs, culverts and other transverse structures)	Instream structures
Activities causing atmospheric emissions	Atmospheric emissions
Activities producing litter	Litter
Climate Change	Climate change
Manufacturing: Industry with discharges – operational	Industry
Mining, extraction of materials: including inorganic, maerl, rock/minerals, sand/gravel, salt	Sand & gravel extraction
Non-renewable power stations (land-based, coastal)	Non-renewable power

Hydropower including storage, run-off and diversion - construction and operation	Hydropower
Urban dwellings and commerical developments	Urbanization
Transport (roads, vehicles, other)	Transport
Water Supply (including reservoirs, desalination)	Water abstraction
Angling and sport fishing (including catch and release and stocking)	Recreational fishing & stocking
Boating/Yachting/Watersports (without engine)	Engineless watersports
Boating/Yachting/Watersports, including tourist boats (with engine)	Motorized watersports
Collecting (bird eggs, individuals, curios, bait)	Collecting
Shore recreational activities (including beaches, terrestrial sports, other shore activities)	Recreation
Tourist resort	Tourism resorts
Waste management - operational disposal of waste or other material and/or sewage treatment and storm overflows	Wastewater management
Research	Research

Table A3.2: Specific Activities

Existing	**Implemented**
General (atmospheric emissions, runoff of nutrients) due to livestock	Livestock grazing
Cultivation of crops (Irrigation, drainage)	Crop farming
Cultivation of forestry (irrigation, drainage)	Forestry drainage
Freshwater Aquaculture - fish ponds in the riparian zone	Ex-situ operation
Flood defence - rivers (embankments)	Embankments

Modern flood defence – rivers (retention ponds, infiltration areas)	Retention & infiltration
Canalisation/managed realignment	Canalisation
Drainage	Drainage
Stocking native and non-native fish species (introduction of disease, non-native species, alteration of genetics of native populations, boating activity)	Stocking
Weirs	Weirs
Deposition due to emissions from outside case study area	Emission deposition
Litter due to activities outside case study area	Exogenous litter
Climate change	Large scale changes
Specific to locality: Industry with discharges into rivers, lakes and coastal waters – operational (Industrial effluent discharge, abstraction of water)	Water abstraction & pollution
Sand/gravel aggregates – extraction of substrate (habitat change, interaction with seafloor, contaminant release)	Extraction
Sand/gravel aggregates – spoil/waste disposal (habitat change, smothering)	Spoil disposal
Power stations (land-based) – operational (atmospheric emissions, abstraction of water, thermal discharge of cooling water, localised effects on hydrography)	Power generation
Hydropower – construction (dams, impoundments, other infrastructure)	Construction
Hydropower – operation (disturbances to bedload balance)	Bedload balance disturbance
Hydropower – operation (water abstraction, hydropeaking)	Hydropeaking disturbance
Hydropower – Reservoirs	Dams & reservoir operation
Urban dwellings and commerical developments – operational (contaminants, litter)	Pollution from operation

Urban dwellings and commerical developments – construction (habitat change, sealing, interaction with seafloor, river bed, lake bottom, smothering, increased turbidity, noise)	Construction
Transport – run off from roads, emmissions, etc.	Pollution from run-off
Reservoirs	Dams & reservoir operation
Water supply	Water abstraction
Angling (catch, bycatch, interaction with seafloor (gear, and anchors if offshore))	Angling
Angling – stocking	Stocking
Boating/Yachting/Watersports (without engine)	Watersports
Boating/Yachting – mooring/anchoring/beaching/launching (interaction with seafloor)	Anchoring
Boating/Yachting – steaming (collisions)	Navigation
Boating/Yachting – general (anti-fouling, ballast water exchange, litter, waste)	Pollution
Bait digging – (trampling, interaction with seafloor, removal of habitat-structuring species)	Bait digging
Bird eggs – (trampling, removal of individuals)	Bird eggs
Curios – (trampling, collecting/releasing for aquarium)	Curious
Peels (boulder turning) – (trampling, removal of individuals)	Peels
Shellfish hand collecting – (trampling, interaction with seafloor, removal of individuals)	Shellfish
Public beach – general (trampling, litter)	Public beach
Terrestrial Sports	Terrestrial sports
Tourist Resort – construction (habitat change, sealing, smothering, increased turbidity, noise)	Construction

Tourist Resort – operational (effluent discharge, abstraction of water, litter)	Water abstraction & pollution
Operational (effluent discharge, thermal discharge) due to disposal of waste or other material and/or due to sewage treatment and storm overflows	Pollution from operation
Research: Operations (specific to activity but can include: interaction with seafloor, riverine habitat, catch, bycatch)	Operations

Table A3.3: Pressure categories

Existing	**Implemented**
Physical change	Physical
Chemical changes, chemicals and other pollutants	Chemical
Biological disturbance	Biological
Energy	Energy
Exogenous/Unmanaged processes	Exogenous

Table A3.4: Pressures

Existing	**Implemented**
Abrasion/Damage	Abrasion
Change of habitat structure/morphology	Morphological change
Changes in input of organic matter	Organic input change
Changes in Siltation	Siltation change
Disturbance (visual) of species	Visual disturbance
Introduction of Non-synthetic compounds	Non-synthetic compound influx
Introduction of Synthetic compounds	Synthetic compound influx

Extraction of flora and/or fauna	Biota extraction
N&P Enrichment	Nutrient enrichment
pH changes	pH change
Smothering	Smothering
Water flow rate changes	Discharge change
Introduction of Microbial pathogens	Pathogen influx
Total Habitat Loss	Habitat loss
Water abstraction	Water abstraction
Barrier to species movement	Longitudinal disconnection
Artificialisation of habitat	Habitat artificialisation
Changes in wave exposure	Wave exposure change
Emergence Regime Changes	Emergence regime change
Thermal changes	Thermal change
Litter	Litter
Emergence regime change (climate change, large-scale)	Emergence regime change (CC)
pH changes (climate change, large-scale)	pH change (CC)
Precipitation regime change (climate change, large-scale)	Precipitation change (CC)
Thermal change (climate change, large-scale)	Thermal change (CC)
Water flow rate changes (climate change, large-scale)	Discharge change (CC)
Input of light	Light pollution
Introduction of Radionuclides	Radionuclides influx
Noise (Underwater and Other)	Noise
Death or Injury by Collision	Collision

Introduction of non-indigenous species	Exotic spp. introduction
Selective Extraction of non-living resources: substrate e.g. gravel	Substrate extraction
Translocations of species (native or non-native)	Spp. Translocation
Salinity changes	Salinity change
Introduction of genetically modified species	GMO introduction

Table A3.5: Pressures

Existing	**Implemented**
Mesic grasslands	Mesic grassland
Seasonally wet and wet grasslands	Wet grassland (floodplain)
Sparsely wooded grasslands	Wooded grassland
Amphibian	Biota: Amphibians
Birds	Biota: Birds
Permanent non-tidal, fast, turbulent watercourses	Lotic rivers and benthos
Permanent non-tidal, smooth-flowing watercourses	Lentic rivers and benthos
Fish & Cephalopods	Biota: Fish & Crayfish
Insects (adults)	Biota: Adult insects
Mammals	Biota: Mammals
Reptiles	Biota: Reptiles
Woodland, forest and other wooded land	Woodland
Broadleaved deciduous woodland	Deciduous woodland
Coniferous woodland	Coniferous woodland
Mixed deciduous and coniferous woodland	Mixed woodland

Lines of trees, small anthropogenic woodlands, recently felled woodland, early-stage woodland and coppice	Anthropogenic woodland

Table A3.6: Ecosystem services

Existing			**Implemented**
Provisioning	Energy	Biomass-based energy sources	Biologically mediated : Provisioning : Energy : Biomass
		Mechanical energy	Biologically mediated : Provisioning : Energy : Mechanical
	Materials	Biomass	Biologically mediated : Provisioning : Materials : Biomass
	Nutrition	Biomass	Biologically mediated : Provisioning : Nutrition : Biomass
Regulation - Maintenance	Maintenance of physical chemical biological conditions	Lifecycle maintenance, habitat and gene pool protection	Biologically mediated : Regulation : Maintenance : Lifecycle
		Pest and disease control	Biologically mediated : Regulation : Maintenance : Disease control
		Soil formation and composition	Biologically mediated : Regulation : Maintenance : Soil formation
		Water conditions	Biologically mediated : Regulation : Maintenance : Water conditions
		Atmospheric composition and climate regulation	Biologically mediated : Regulation : Maintenance : Climate regulation

	Mediation of flows	Mass flows	Biologically mediated : Regulation : Flow : Solids
		Liquid flows	Biologically mediated : Regulation : Flow : Liquid
		Gaseous / air flows	Biologically mediated : Regulation : Flow : Gaseous
	Mediation of waste toxics and other nuisances	Mediation by biota	Biologically mediated : Regulation : Waste mediation : Biota
		Mediation by ecosystems	Biologically mediated : Regulation : Waste mediation : Ecosystems
Cultural	Physical and intellectual interactions with biota ecosystems and land seascapes environmental settings	Physical and experiential interactions	Biologically mediated : Cultural : Interactions : Experiential
		Intellectual and representative interactions	Biologically mediated : Cultural : Interactions : Intellectual
	Spiritual symbolic and other interactions with biota ecosystems and land seascapes environmental settings	Spiritual and/or emblematic	Biologically mediated : Cultural : Symbolic : Spiritual
		Other cultural outputs	Biologically mediated : Cultural : Symbolic : Other
Abiotic Provisioning	Energy abiotic	Renewable abiotic energy sources	Abiotic output : Provisioning : Energy : Renewable
		Non-renewable abiotic energy sources	Abiotic output : Provisioning : Energy : Non-renewable
	Abiotic materials	Water	Abiotic output : Provisioning : Materials : Water

		Metallic	Abiotic output : Provisioning : Materials : Metallic
		Non-metallic	Abiotic output : Provisioning : Materials : Non-metallic
	Nutritional abiotic substances	Water	Abiotic output : Provisioning : Nutrition : Water
		Mineral	Abiotic output : Provisioning : Nutrition : Mineral
		Non-mineral	Abiotic output : Provisioning : Nutrition : Non-Mineral
Regulation Maintenance by abiotic structures	Maintenance of physical chemical abiotic conditions	By natural chemical and physical processes	Abiotic output : Regulation : Maintenance : Physico-chemistry
	Mediation of flows by natural abiotic structures	solid (mass), liquid and gaseous (air) flows	Abiotic output : Regulation : Maintenance : Flows
	Mediation of waste toxics and other nuisances	By natural chemical and physical processes	Abiotic output : Regulation : Maintenance : Waste mediation
Cultural settings dependent on aquatic abiotic structures	Physical and intellectual interactions with land seascapes physical settings	Physical and experiential interactions	Abiotic output : Cultural : Interactions : Experiential
		Intellectual and representative interactions	Abiotic output : Cultural : Interactions : Intellectual
	Spiritual symbolic and other interactions with	Spiritual and/or emblematic	Abiotic output : Cultural : Symbolic : Spiritual

	land seascapes physical settings	Other cultural outputs	Abiotic output : Cultural : Symbolic : Other

Table A3.6: Ecosystem functions

Existing		**Implemented**
Production	Primary production	Primary production
	Secondary production	Secondary production
Biogeochemical Cycles	Hydrological cycling (O and H)	Water cycle
	Carbon cycling (C)	Carbon cycle
	Nitrogen cycling (N)	Nitrogen cycle
	Phosphorus cycling (P)	Phosphorus cycle
	Sulfur cycling (S)	Sulphur cycle
	other element cycling	Other cycles
	Nutrient retention	Nutrient retention
	Carbon sequestration	Carbon sequestration
Mechanical, physically structuring	Habitat provision	Habitat provision
	Nursery function	Nursery
	Breeding grounds	Breeding grounds
	Feeding grounds	Feeding grounds
	Refugia	Refugia
	Dispersal	Dispersal
	Biological control	Biological control
	Decomposition (mechanical&chemical)	Decomposition

	Filtration	Filtration
	Sediment stability & formation	Sediment stabilization

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