

WP4.4 Pilot Case Studies indicators database for MCA

Structure of Bard – Dora Baltea decisional tree

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Summary

SHORT DESCRIPTION

This document intends to describe the structure of the SESAMO trees project and the MCA application to the Pilot Case Study of Bard – Dora Baltea river.

Document Control

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Summary

The report summarizes the general methodological approach, the criteria and the indicators used to test the multi criteria analysis (MCA) on the Bard – Dora Baltea Pilot Case Study. The report highlights the progression of MCA model development. The main analyzed aspects are:

- Focus on MCA application;
- Criteria, sub-criteria, & Indicators evaluation;
- Layout of the decision tree.

Structure of Bard – Dora Baltea decisional tree

The Dora Baltea river

The **Dora Baltea basin** includes an important hydrographic network that stretches from the Piedmont to the entire North-Western Region of Valle d'Aosta, with a basin of over 3.261 km². Dora Baltea represents one of the **five major tributaries of the River Po** with average annual contributions equal to 110 m³/sec.

The river originates with its two branches, the Dora of Veny valley and the Dora of Ferret valley, from the glaciers of Mont Blanc. From the confluence of the two at the mouth of the Po river the Dora river has a length of about 152 km.

The track is initially directed from northwest to southeast, shortly before Aosta town assumes trend west-east just to Saint Vincent town, where it was heading south-east, keeping to the confluence.

The Dora river receives **numerous tributaries** on both sides and flows with sinuous at times sub-straight in a valley carved with rather steep rock slopes.

The tributaries of the right side deriving from all the northern slopes of the Gran Paradiso, that separates the Aosta Valley region to the adjacent basin of Orco river; the streams are: Dora of La Thuile, Dora of Valgrisanche, Dora of Rhemes, Savara river, Grand'Eyvia river, Clavalité river, Chalamy and Ayasse rivers.

On the left side the main tributaries, which flow from the peaks of the Cervino and Monte Rosa are Buthier river, St. Barthelemy river, Marmore, Evançon and Lys rivers.

The **presence of glaciers** heavily influences the Dora Baltea flow regime with pronounced winter minimum and summer maximum in accordance with the period of maximum glacier ablation.

The Dora Baltea basin is classified as an **inland alpine basin** just to the confluence of the river Lys. The mountain ranges offer a direct protection against humid air from the Atlantic and therefore have rather modest rainfall totals in terms of intensity.

The **main meteo-climatic characteristics** of the Dora Baltea river basin are:

- A thermal distribution that faithfully follows the mountain profile with the average value of 10°C in the plan, the average value of 0°C at the height of 2500 m slm and the average value of -5°C at the height of 3400 m slm [extracted from the "*Atlante climatico della Valle d'Aosta*", L. Mercalli et al.]
- A distribution of precipitations that shows yearly average values of 500 mm/y in the central part of the basin and yearly average values of 2000 mm/y in the North-West and South-East sectors.

From the hydrological point of view the transformation of inflows in runoff is strongly influenced by these characteristics and in particular by the presence of snowfields and glaciers.

In fact, since the mountain basin consists of vast areas above 2000 m asl, the rainfall occurs for a long part of the year mainly as snow and does not contribute to the formation of the flood.

The distribution of flow has the maximum from June to July to coincide with the melting of snow and ice and the minimum in winter.

Floods generally occur between late spring and early autumn, when the snowfall is proportionally low. Sometimes, especially in late spring, the presence of a still substantial snowpack causes a significant increase in the contribution of flood for the effect of melting snow.

In this geographical area, a typical inland alpine basin, often the occurrence of critical floods don't correspond to the maximum intensity values of rainfall recorded by the rainfall stations, but to the coincidence of a number of negative factors (in addition to high intensity rainfall) including essentially the occurrence of abnormal temperature rises and the presence of a large blanket of snow.

In the secondary basins occur frequently floods caused by rain or storms of great intensity but low extension. In these cases there may be **significant sediment transport phenomena**.

The hydropower plant

In the Dora Baltea river basin there are **148 HP plants** different for typology and power installed [data source Aosta Valley Region - data uploaded to 2009]. Of these 31 are of Aosta Valley Water Company [CVA] property and 117 are private. The efficient power of the installed plants on the entire basin is 900 MW: 830 MW for CVA plants and 70 MW for private investment over 70 kW [data source: Aosta Valley Regional Energy Plan, RAVA – 2003].

The **annually hydropower produced** throughout the Dora Baltea river basin amounted to **2609 GWh** [data source: Aosta Valley Regional Energy Plan, RAVA – 2003].

The **Bard withdrawal** on the Dora Baltea river is detailed by the following scheme:

BARD INTAKE		IMAGE [PHOTO: S. VENTURINI]		
Code	CVA-B-BAR			
Property	CVA			
Plant	Bard			
Typology	run-of			
Other intakes	No			
Power installed	3.2			MW
Energy yearly production average	25.17			GWh
Year building	1941			

Alternatives description

The alternatives examined with the MCA concern the amount of MIF release. The Alternatives considered have been 2:

- 1. ALTERNATIVE 0** (HISTORICAL MANAGEMENT UNTIL 2008): until 2008 not MIF released.
- 2. ALTERNATIVE 1** (20% OF MIF): 20% of the MIF released with the collection of the data referred to each indicator for one year.

The Bard – Dora Baltea river MCA tree

- [-] ARPA_VdA_Bard_tree
 - [-] ENERGY_PRODUCTION
 - [-] Annual_Energy_Produced_[Gwh/year] (F)
 - [-] Linear_Annual_Energy_Produced_[Gwh/year] (F)
 - [-] ECONOMY__Administration_Level_[related_to_HP_exploitation]
 - [-] Economy__Regional_Level_[€_GDP] (F)
 - [-] ECONOMY__Producer_Level_[related_to_HP_exploitation]
 - [-] Financial_Outcomes__HP_Producer_Level_[€] (F)
 - [-] RIVER_ECOSYSTEM
 - [-] PHYSICO_CHEMICAL_PARAMETERS
 - [-] $\Delta_{sub_LIM_Escherichiacoli_UFC/100m}$
 - [-] $\Delta_{sub_IBE_EPT}$
 - [-] FISH
 - [-] Available_weighted_Area_for_Fish__[IFIM]
 - [-] Fish_population_suitability/potentiality_index_[N] (F)
 - [-] HYDROMORPHOLOGY
 - [-] Hydrological_regime
 - [-] FISHING
 - [-] Fisherman_Score
 - [-] LANDSCAPE
 - [-] Landscape_Scenary_Value_Tyrol_[N] (F)

SESAMO tree for the Bard – Dora Baltea Pilot Case Study

Indicators description – Bard – Dora Baltea River Pilot Case Study

The following section contains the metadata of every indicator used in the Bard – Dora Baltea River Pilot Case Study directly related to MCA SESAMO software.

The structure of the decision tree for the Bard – Dora Baltea river Pilot Case Study considers 7 main branches called **Criteria**:

- **Energy production**
- **Economy at administration level**
- **Economy at producer level**
- **River ecosystem**
- **Fishing**
- **Landscape**

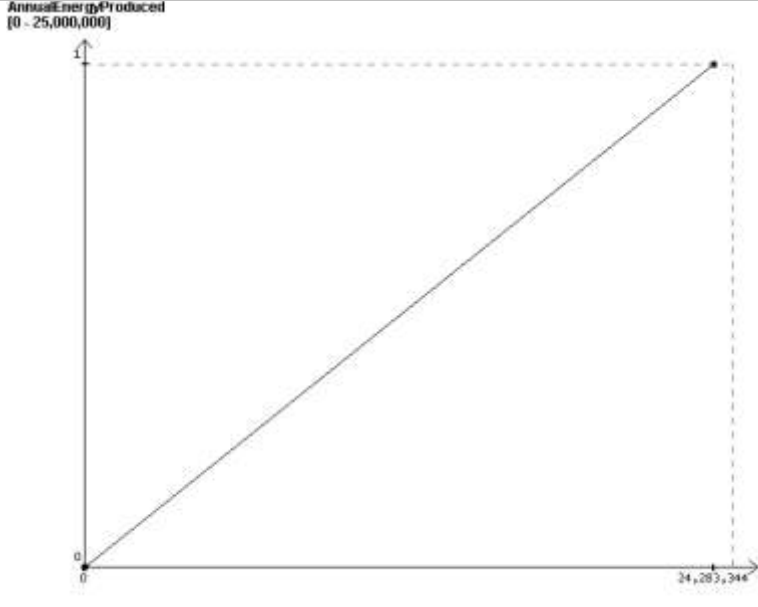
Energy production

The **Energy production criterion** is divided into **2 indicators**:

- **Annual energy produced**
- **Linear annual energy produced**

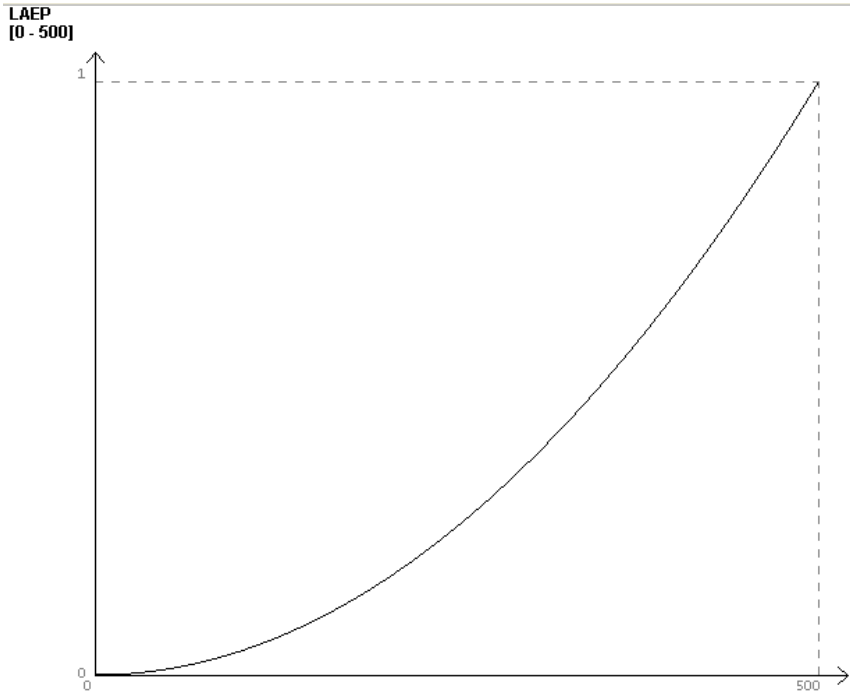
Bard – Dora Baltea tree | ENERGY | Annual energy produced

FIELD	DESCRIPTION
INDICATOR NAME	Annual Energy Produced
ACRONYM	/
DPSIR	D (Driving Forces)
DESCRIPTION	This indicator furnishes an evaluation of the annual plant energy production (GWh/year) assessed (for proposed plants not already realized) or measured (for existing plants).
AIM	It furnishes an evaluation of the annual energy production which is the master aim of every HP plant manager
KEY MESSAGE	The HP plant energy produced is the focal aim of every HP plant manager
MEASURE UNIT	GWh/year
REFERENCES	/
FIELD	METHODS AND MONITORING STANDARDS
INDICATOR ELABORATION	This indicator furnishes an evaluation of the annual plant energy production (GWh/year) assessed (for proposed plants not already realized) or measured (for existing plants).
INDICATOR LIMITS	Only data which are provided by the HP plant owner can be used.
EVALUATION	/
AVAILABLE UF	YES
UF	The Utility Function adopted is LINEAR growing

	
SHARE RELATED INDICATORS	Linear annual energy produced
COUNTRY CODE	IT
WFD HER	INNER ALPS SOUTH
FIELD	DATASOURCES
DATA SOURCE	HP producer
TIME COVER	~ 10 ÷ 1
UPDATE FREQUENCY	Annual
NUT III CODE	ITC20
NORMATIVE REFERENCE	Local
NORMATIVE RELEVANCE	Moderate
SHARE PILOT CASE STUDY	Bard – Dora Baltea river

Bard – Dora Baltea tree | ENERGY | Linear Annual Energy Produced

FIELD	DESCRIPTION
INDICATOR NAME	Linear Annual Energy Produced
ACRONYM	/
DPSIR	D (Driving Forces)
DESCRIPTION	This indicator furnishes an evaluation of the annual plant energy production, relative to one length unit of river and to each liter turbinated, assessed (for proposed plants not already realized) or measured (for existing plants). The indicator becomes significant when there is two or more alternatives to be appraised in which the points of withdrawal or restitution of the diverted flow are different (where is different therefore the stretch withdrawn) or, in other way, where is set to comparison the

	productivities of different plants in relation to the unity length of derived river stretch.
AIM	It furnishes an evaluation of the energy production relative to one length unit of river to allow the evaluation of the intrinsically power of each river stretch and allows the comparison between different plants.
KEY MESSAGE	The river energy production related to bypassed river length evaluates the energy river capacity linked to the withdrawal
MEASURE UNIT	GWh/year
REFERENCES	/
FIELD	METHODS AND MONITORING STANDARDS
INDICATOR ELABORATION	The indicator is calculated as the ratio between annual energy produced and river length bypassed by HP for each cubic meter turbined.
INDICATOR LIMITS	/
EVALUATION	/
AVAILABLE UF	YES
UF	<p>The Utility Function adopted is the following</p> 
SHARE RELATED INDICATORS	Annual power produced
COUNTRY CODE	IT
WFD HER	INNER ALPS SOUTH
FIELD	DATASOURCES
DATA SOURCE	HP producer
TIME COVER	~ 10 ÷ 1
UPDATE FREQUENCY	Annual

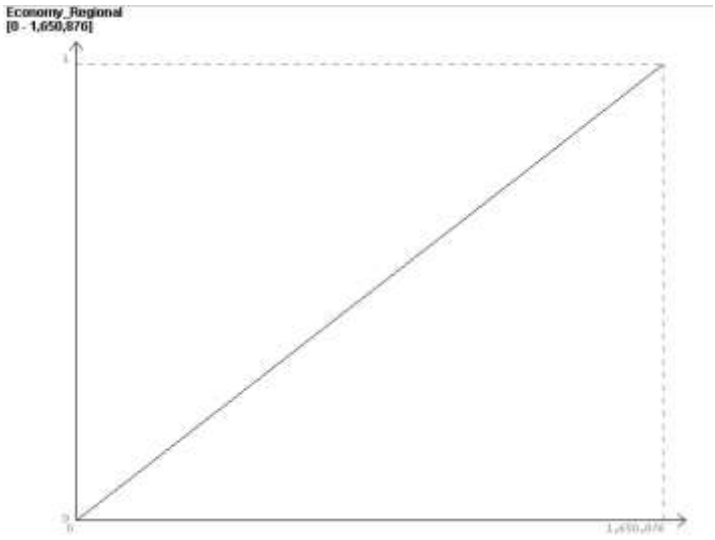
NUT III CODE	ITC20
NORMATIVE REFERENCE	Local
NORMATIVE RELEVANCE	Moderate
SHARE PILOT CASE STUDY	Bard – Dora Baltea river

Economy at administration level

The **Energy at administration level criterion** is detailed by the **Economy regional level indicator**.

Bard – Dora Baltea tree | Economy at administration level | Economy regional level

FIELD	DESCRIPTION
INDICATOR NAME	Economy - Regional level
ACRONYM	/
DPSIR	P (Pressures)
DESCRIPTION	This indicator furnishes an evaluation of wider direct economic outcomes on the territories in the same administrative region of HP plant location; it assess the degree of satisfaction of regional administrator related to the different management alternatives considered in the MCA. The direct economic outcomes are represented by the fee of derivation concession. If you compare the fee of a single plant to the administration budget it can represent an exiguous percentage to be appreciated and valued; the utility of this indicator can often be represented in the phase of planning on territorial scale where the whole of the new fees related to the new planned plants can have a meaningful weight on the local administration budgets.
AIM	This indicator directly considers the a aims of the public administrator to maximize the economical benefits for local communities.
KEY MESSAGE	The financial outcomes of HP exploitation could / should have an evaluable economic benefit for local communities strictly related to different management alternatives considered in the MCA.
MEASURE UNIT	€ (GDP)
REFERENCES	/
FIELD	METHODS AND MONITORING STANDARDS
INDICATOR ELABORATION	The elaboration has to be shaped on a reasonable assessment on real financial outcomes variability.
INDICATOR LIMITS	The elaboration has to be shaped on a reasonable assessment on real financial outcomes variability.
EVALUATION	/
AVAILABLE UF	YES

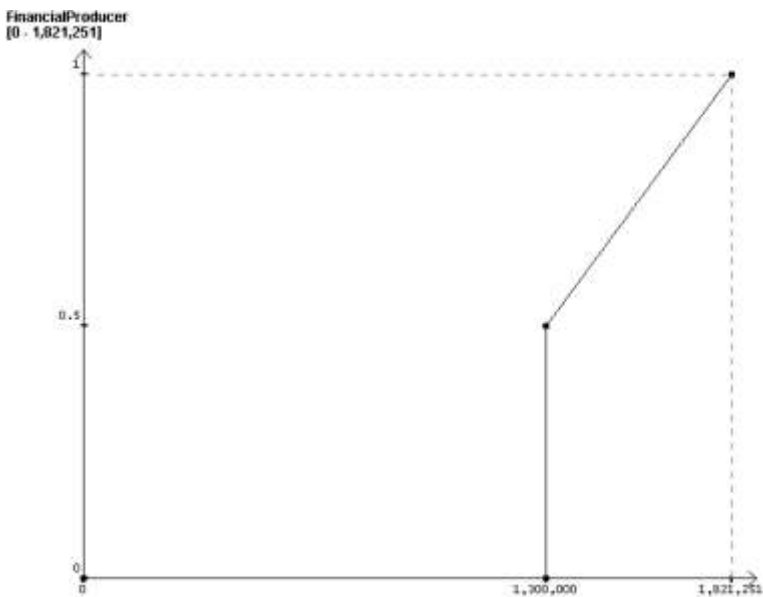
UF	<p>The Utility Function adopted is LINEAR growing</p> 
SHARE RELATED INDICATORS	/
COUNTRY CODE	IT
WFD HER	INNER ALPS SOUTH
FIELD	DATASOURCES
DATA SOURCE	HP producer
TIME COVER	~ 10 ÷ 1
UPDATE FREQUENCY	Annual
NUT III CODE	ITC20
NORMATIVE REFERENCE	Local
NORMATIVE RELEVANCE	Bad
SHARE PILOT CASE STUDY	Bard – Dora Baltea river

Economy at producer level

The **Energy at producer level criterion** is detailed by the **Financial outcomes HP producer level indicator**.

Bard – Dora Baltea tree | Economy at producer level | Financial outcomes HP producer level

FIELD	DESCRIPTION
INDICATOR NAME	Financial outcomes - HP producer level
ACRONYM	/
DPSIR	P (Pressures)

DESCRIPTION	This indicator furnishes an evaluation of financial outcomes and degree of satisfaction of HP producer related to the different management alternatives considered in the MCA.
AIM	This indicator directly considers the producer aims that are mainly related to the economics outcomes.
KEY MESSAGE	The financial outcomes are the main aim for investors involved in the HP production: financial conditions strictly shape the different management alternatives considered in the MCA.
MEASURE UNIT	€
REFERENCES	/
FIELD	METHODS AND MONITORING STANDARDS
INDICATOR ELABORATION	The elaboration has to be shaped on a reasonable assessment on real financial outcomes variability.
INDICATOR LIMITS	The economic outcomes of this indicators are related only to the HP producers and not to the territory or the region or the administrative unit.
EVALUATION	/
AVAILABLE UF	YES
UF	<p>The Utility Function adopted is the following</p> 
SHARE RELATED INDICATORS	/
COUNTRY CODE	IT
WFD HER	INNER ALPS SOUTH
FIELD	DATASOURCES
DATA SOURCE	HP producer
TIME COVER	~ 10 ÷ 1
UPDATE FREQUENCY	Annual
NUT III CODE	ITC20

NORMATIVE REFERENCE	Local
NORMATIVE RELEVANCE	Bad
SHARE PILOT CASE STUDY	Bard – Dora Baltea river

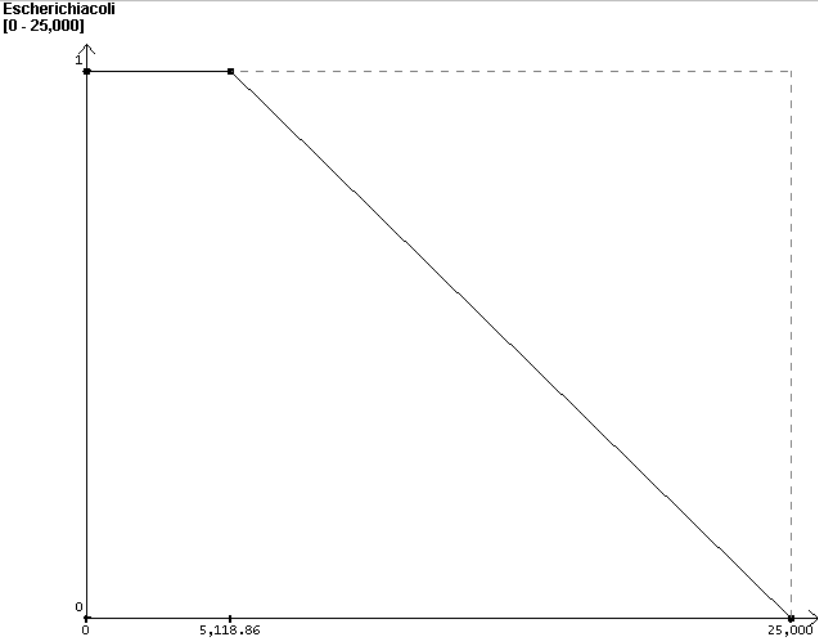
River ecosystem

The **River ecosystem criterion** is detailed by the **following indicators**:

- $\Delta_{\text{sub LIM}}$ – *Escherichia coli*
- $\Delta_{\text{sub IBE}}$ – EPT taxa
- Available weighted area for fish – IFIM
- Fish population suitability/potentiality index
- Hydrological regime

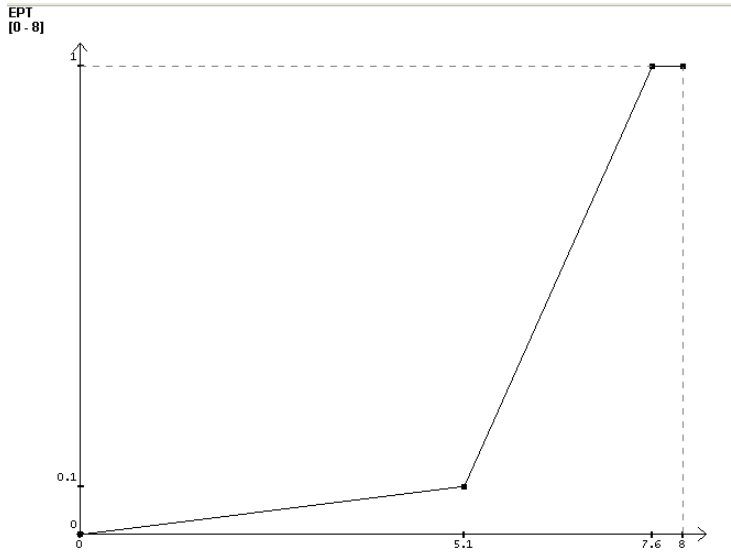
Bard – Dora Baltea tree | River Ecosystem | $\Delta_{\text{sub LIM}}$ – *Escherichia coli*

FIELD	DESCRIPTION
INDICATOR NAME	$\Delta_{\text{sub LIM}}$ [sub-Livello di Inquinamento da Macrodescrittori] - <i>Escherichia coli</i>
ACRONYM	$\Delta_{\text{sub LIM}}$ - E. coli
DPSIR	P (Pressures)
DESCRIPTION	This indicator furnishes an evaluation of the pollution level due to chemical and microbiological factors through the use of a series of fundamental environmental parameters for the chemical-microbiological characterization of the river: <i>Escherichia coli</i> [UFC/100ml] concentration.
AIM	This indicator furnishes an evaluation of the pollution level due to chemical and microbiological factors through the use of a series of fundamental environmental parameters for the chemical-microbiological characterization of the river: <i>Escherichia coli</i> [UFC/100ml] concentration and total value of Phosphorus [mg/L]. The ratio is referred to the conditions upstream and downstream the point of a water withdrawal point.
KEY MESSAGE	This indicator furnishes an evaluation of the pollution level due to chemical and microbiological factors through the use of a series of fundamental environmental parameters for the chemical-microbiological characterization of the river: <i>Escherichia coli</i> [UFC/100ml] concentration.
MEASURE UNIT	N
REFERENCES	/
FIELD	METHODS AND MONITORING STANDARDS
INDICATOR ELABORATION	It is applied the methodology described for the connected indicators: total Phosphorus (mg / L) and <i>Escherichia coli</i> (UFC/100ml). The index calculation is doing through the attribution of a score to every macro descriptors.
INDICATOR LIMITS	/
EVALUATION	/
AVAILABLE UF	YES
UF	The Utility Function is the following

	
SHARE RELATED INDICATORS	/
COUNTRY CODE	IT
WFD HER	INNER ALPS SOUTH
FIELD	DATASOURCES
DATA SOURCE	Eaulogie s.r.l. per CVA trading
TIME COVER	Since 2008
UPDATE FREQUENCY	Montly
NUT III CODE	ITC20
NORMATIVE REFERENCE	National
NORMATIVE RELEVANCE	Poor
SHARE PILOT CASE STUDY	Bard – Dora Baltea river

Bard – Dora Baltea tree | River Ecosystem | $\Delta_{sub\ IBE}$ – EPT taxa

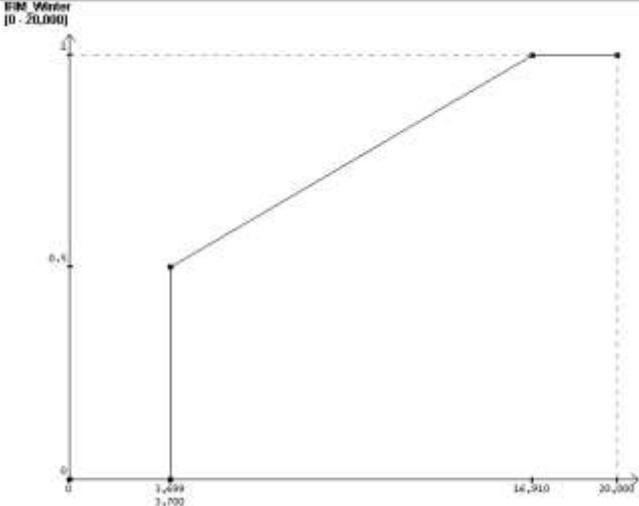
FIELD	DESCRIPTION
INDICATOR NAME	$\Delta_{sub\ IBE}$ [sub-Indice Biotico Estesò]
ACRONYM	$\Delta_{sub\ IBE}$ – EPT taxa
DPSIR	P (Pressures)
DESCRIPTION	Macrobenthic index founded upon the analysis of the macroinvertebrates community structure that colonizes the different river typologies. The index appraises how the present macroinvertebrates community is far from the attended one. This sub-indicator allows to express a water quality judgment on the base of

	modifications on the macroinvertebrates groups composition [EPT, ...]
AIM	This indicator expresses a quality judgment of a river environment on the base of the macroinvertebrates community composition modifications, induced from factors of pollution of the waters and the sediments or from meaningful physical and morphological alterations of the bankfull.
KEY MESSAGE	This indicator allows to express judgments of quality in river environments on the base of the modifications in the macroinvertebrates community composition
MEASURE UNIT	N
REFERENCES	/
FIELD	METHODS AND MONITORING STANDARDS
INDICATOR ELABORATION	It is carried out the taxa presence/absence analysis of the benthos samples used for the IBE index calculation; from this dataset it's considered a selection of taxa [EPT] and its relative auto-ecological parameters [feeding groups, trophic groups, ...]
INDICATOR LIMITS	The IBE index is not applicable in transitional waters or in extreme situations. This index could be able to underestimate the pollution consequential from organic load.
EVALUATION	/
AVAILABLE UF	YES
UF	<p>The Utility Function is the following</p> 
SHARE RELATED INDICATORS	/
COUNTRY CODE	IT
WFD HER	INNER ALPS SOUTH
FIELD	DATASOURCES
DATA SOURCE	Eaulogie s.r.l. per CVA trading
TIME COVER	Since 2008
UPDATE FREQUENCY	Seasonal
NUT III CODE	ITC20
NORMATIVE REFERENCE	Regional
NORMATIVE RELEVANCE	Poor

SHARE PILOT CASE STUDY	Bard – Dora Baltea river
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Bard – Dora Baltea tree | River Ecosystem | Available Weighted Area for Fish [IFIM]

FIELD	DESCRIPTION
INDICATOR NAME	Available Weighted Area for Fish - downstream stretch
ACRONYM	ADP
DPSIR	P (Pressures)
DESCRIPTION	This indicator estimates the amount of habitat available in different stretches of a river for one or more target species, depending on the flow flowing out in bed. It comes from the method of IFIM. In particular, on the basis of morpho-hydraulic information, allows to predict how the environmental typology of the riverbed changes as a function of several discharges. These changes are evaluated in relation with the relative availability of suitable areas of the stream for the biological cycle of a fish species, identified as target species (brown trout and trout in Aosta Valley).
AIM	“IFIM is based on the analysis of habitat for stream-dwelling organisms under alternative management treatments. One could logically question why habitat was chosen as the decision variable in IFIM when there are so many other factors (such as stream productivity or fishing mortality) that can potentially influence fish populations. The simplest reason for basing the analysis on habitat is that IFIM was designed to quantify environmental impacts, and impacts to habitat are the most direct and quantifiable.” (Stalnaker et al., 1995, p. 16).
KEY MESSAGE	/
MEASURE UNIT	% N
REFERENCES	/
FIELD	METHODS AND MONITORING STANDARDS
INDICATOR ELABORATION	See IFIM methodology
INDICATOR LIMITS	/
EVALUATION	/
AVAILABLE UF	YES
UF	The Utility Function is the following

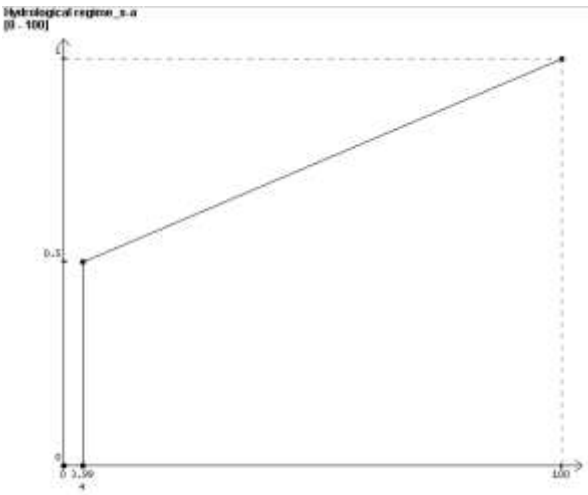
	
SHARE RELATED INDICATORS	/
COUNTRY CODE	IT
WFD HER	INNER ALPS SOUTH
FIELD	DATASOURCES
DATA SOURCE	Eaulogie s.r.l. per CVA trading
TIME COVER	2008
UPDATE FREQUENCY	Annual
NUT III CODE	ITC20
NORMATIVE REFERENCE	Local
NORMATIVE RELEVANCE	Moderate
SHARE PILOT CASE STUDY	Bard – Dora Baltea river

Bard – Dora Baltea tree | River Ecosystem | Fish population suitability/potentiality index

FIELD	DESCRIPTION
INDICATOR NAME	Fish population suitability/potentiality index
ACRONYM	/
DPSIR	S (State)
DESCRIPTION	<p>Indicator designed specifically for the Aosta Valley situation, elaborated from the drafts in the Interreg project "Truites Autochtones" and the "Guidelines for the preparation of new HP project under the PTA."</p> <p>It consists of two sub-indices:</p> <ol style="list-style-type: none"> 1. Estimation of the population present at the time of sampling. 2. Suitability of fish, as estimated by applying the IFF 2007 (reference no. 10), supported by expert opinion.

AIM	The purpose of this indicator is classified in a simple way the the Aosta Valley streams, and their treats, according to suitability and presence of fish populations.										
KEY MESSAGE	Assessing of the biological condition of the fish population resident in Aosta Valley streams.										
MEASURE UNIT	N										
REFERENCES	/										
FIELD	METHODS AND MONITORING STANDARDS										
INDICATOR ELABORATION	See IFIM methodology										
INDICATOR LIMITS	/										
EVALUATION	/										
AVAILABLE UF	YES										
UF	<p>The Utility Function is the following</p> <table border="1"> <caption>Data points for the Utility Function</caption> <thead> <tr> <th>Fish population (x)</th> <th>Utility Function (y)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>1</td> </tr> <tr> <td>2</td> <td>0.75</td> </tr> <tr> <td>3</td> <td>0.5</td> </tr> <tr> <td>4</td> <td>0.25</td> </tr> </tbody> </table>	Fish population (x)	Utility Function (y)	1	1	2	0.75	3	0.5	4	0.25
Fish population (x)	Utility Function (y)										
1	1										
2	0.75										
3	0.5										
4	0.25										
SHARE RELATED INDICATORS	/										
COUNTRY CODE	IT										
WFD HER	INNER ALPS SOUTH										
FIELD	DATASOURCES										
DATA SOURCE	Eaulogie s.r.l. per CVA trading										
TIME COVER	2008										
UPDATE FREQUENCY	Annual										
NUT III CODE	ITC20										
NORMATIVE REFERENCE	Local										
NORMATIVE RELEVANCE	Moderate										
SHARE PILOT CASE STUDY	Bard – Dora Baltea river										

Bard – Dora Baltea tree | River Ecosystem | Hydrological regime

FIELD DESCRIPTION	
INDICATOR NAME	Hydrological regime
ACRONYM	/
DPSIR	S (State)
DESCRIPTION	Purpose of the hydrological regime indicator is to describe how much the river water regime is far from the natural one, without considering the effects on the biological ecosystem components, but only because peculiar characteristic of a river.
AIM	The aim of this indicator is to describe the "form" of natural discharges, appraising how much these are far from those of the reference status.
KEY MESSAGE	Purpose of the hydrological regime indicator is to describe how much the river water regime is far from the natural one.
MEASURE UNIT	%
REFERENCES	/
FIELD METHODS AND MONITORING STANDARDS	
INDICATOR ELABORATION	The indicator is calculated as percentage of natural discharge available on the river bed.
INDICATOR LIMITS	/
EVALUATION	/
AVAILABLE UF	YES
SHARE RELATED INDICATORS	The Utility Function is the following 
SHARE RELATED INDICATORS	----
COUNTRY CODE	IT
WFD HER	INNER ALPS SOUTH
FIELD DATASOURCES	
DATA SOURCE	/
TIME COVER	/
UPDATE FREQUENCY	/
NUT III CODE	ITC20

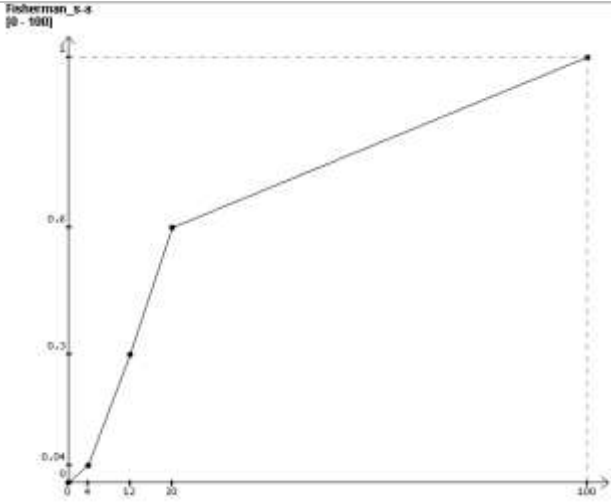
NORMATIVE REFERENCE	/
NORMATIVE RELEVANCE	Poor
SHARE PILOT CASE STUDY	Bard – Dora Baltea river

Fishing

The **Fishing criterion** is detailed by the **Fisherman score indicator**.

[Bard – Dora Baltea tree](#) | [Fishing](#) | [Fisherman score](#)

FIELD	DESCRIPTION
INDICATOR NAME	Fisherman score
ACRONYM	/
DPSIR	I (Impacts)
DESCRIPTION	It is a simple indicator to assess the satisfaction of fishermen sector for different percentage of water flowing out in river bed.
AIM	The indicator aims to assess the satisfaction of fishermen sector for different percentage of water flowing out in river bed.
KEY MESSAGE	The indicator assess the satisfaction of fishermen sector for different percentage of water flowing out in river bed.
MEASURE UNIT	%
REFERENCES	/
FIELD	METHODS AND MONITORING STANDARDS
INDICATOR ELABORATION	/
INDICATOR LIMITS	/
EVALUATION	/
AVAILABLE UF	YES
UF	The Utility Function is the following

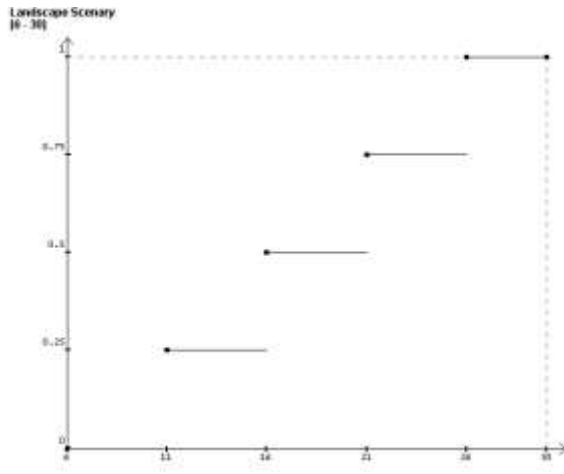
	
SHARE RELATED INDICATORS	/
COUNTRY CODE	IT
WFD HER	INNER ALPS SOUTH
FIELD	DATASOURCES
DATA SOURCE	/
TIME COVER	/
UPDATE FREQUENCY	Once
NUT III CODE	ITC20
NORMATIVE REFERENCE	/
NORMATIVE RELEVANCE	Bad
SHARE PILOT CASE STUDY	Bard – Dora Baltea river

Landscape

The **Landscape criterion** is detailed by the **Landscape Scenery Value for Tyrol indicator**.

Bard – Dora Baltea tree | Landscape | Landscape Scenery Value for Tyrol

FIELD	DESCRIPTION
INDICATOR NAME	Landscape Scenery Value for Tyrol
ACRONYM	/
DPSIR	S (State)
DESCRIPTION	This indicator has been developed and applied in Tyrol (AT) to assessing the HP facilities impact on the landscape. This indicator is fully described on the document "Bewertung der Wasserkraft in Tirol - Kriterienkatalog Version 3.0".
AIM	This indicator aims to assess the HP facilities impact on the landscape.
KEY MESSAGE	This indicator assess the HP facilities impact on the landscape.

MEASURE UNIT	N
REFERENCES	/
FIELD	METHODS AND MONITORING STANDARDS
INDICATOR ELABORATION	<p>The assessment conducted on the qualitative parameters: Visibility Diversity/ Uniqueness/ Beauty for:</p> <ul style="list-style-type: none"> - Origin of the landscape elements - Uniqueness - Representativity - Recreational Value <p>The final value is the sum of the sub-criteria (parameter) Visibility, Origin of the landscape elements, Uniqueness, Representativity and Recreational Value. The indicator is articulated in 5 different quality classes (from 1 - high, to 5 - bad).</p>
INDICATOR LIMITS	/
EVALUATION	/
AVAILABLE UF	YES
UF	<p>The Utility Function is the following</p> 
SHARE RELATED INDICATORS	/
COUNTRY CODE	IT
WFD HER	INNER ALPS SOUTH
FIELD	DATASOURCES
DATA SOURCE	"Bewertung der Wasserkraft in Tirol - Kriterienkatalog Version 3.0"
TIME COVER	/
UPDATE FREQUENCY	Once
NUT III CODE	ITC20
NORMATIVE REFERENCE	/
NORMATIVE RELEVANCE	Bad
SHARE PILOT CASE STUDY	Bard – Dora Baltea river

Weights assignment

The weights (W) assigned to the different criteria are shown in the following table.

CRITERIA	WEIGHT	INDICATORS	WEIGHT
Energy production	0.25	Annual energy produced	0.90
		Linear annual energy produced	0.10
Economy at administration level	0.1	Economy at regional level	1
Economy at producer level	0.1	Financial outcomes	1
River ecosystem	0.2	$\Delta_{\text{sub LIM}} - \textit{Escherichia coli}$	0.01
		$\Delta_{\text{sub IBE}} - \text{EPT taxa}$	0.01
		Fish	0.01
		Hydrological regime	0.97
Fishing	0.1	Fisherman score	1
Landscape	0.25	Landscape Scenary value for Tyrol	1

Evaluation of alternatives performance

Calculations have been made for two different Alternatives regarding MIF release. The score of the indicators for the Alternatives explanation are showed in the following table.

CRITERIA	ALT. 0	ALT. 1
	HISTORICAL MANAGEMENT UNTIL 2008	20% OF THE MIF
Annual Energy Produced [GWh/year]	0,15625	0,148611
Linear Annual Energy Produced [GWh/year]	0	0
Economy at regional level [€ GDP]	0.01	0.01
Economy at producer level [€]	0.01	0.091
$\Delta_{\text{sub LIM}} \textit{Escherichia coli}$ [N]	0.002	0.002
$\Delta_{\text{sub IBE}} \text{EPT taxa}$ [N]	0.001	0.001
Available Weighted Area for Fish [IFIM] [% N]	0.001	0
Fish population suitability/potentiality index [N]	0	0
Hydrological regime [%]	0.063	0.074
Fisherman Score [%]	0.004	0.025
Landscape Scenary Value Tyrol [N]	0	0.062