







ordine

Grenoble

13 June 2018

Évaluation biophysique et économique des Services intertion Ecosistemiques

e la Ricerca Ambiental

Angioletta Voghera DIST- Politecnico di Torino











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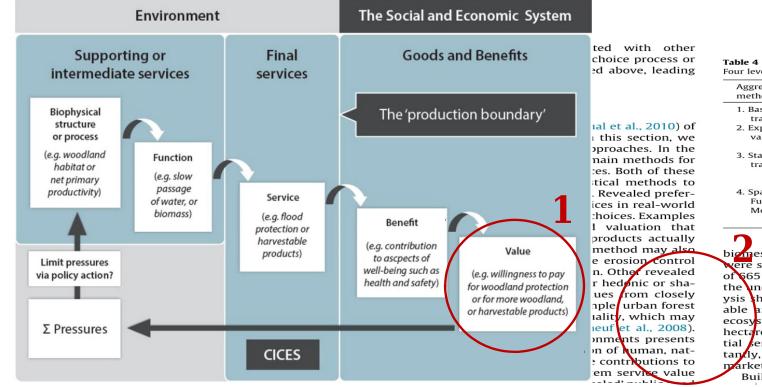
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Four levels of ecosystem service value aggregation (Kubiszewski et al. 2013a).

Aggregation method	Assumptions/approach	Examples
1. Basic value transfer	assumes values constant over ecosystem types	Costanza et al. (1997) and Liu et al. (2010)
2. Expert modified value transfer	adjusts values for local ecosystem conditions using expert opinion surveys	Xie et al. (2008) and Batker et al. (2010)
3. Statistical value transfer	builds statistical model of spatial and other dependencies	Liu and Stern (2008), de Groot et al. (2012) and Schmidt et al. (2016)
4. Spatially Explicit Functional Modeling	Builds spatially explicit statistical or dynamic systems models incorporating valuation	Boumans et al. (2002, 2015), Costanza et al. (2008) and Nelson et al. (2009)

biomes expressed in monetary units. In total, over 320 publications ere screened covering over 300 case study locations. A selection of 65 value estimates were used for the analysis. Acknowledging the uncertainties and contextual nature of any valuation, the analvsis shows that the total value of ecosystem services is considerable and ranges between 490 \$/ha/year for the total bundle of ecosystem services that can potentially be provided by an 'average' hectare of open oceans to almost 350,000 \$/ha/year for the potential services of an 'average' hectare of coral reefs. More importanly, their results show that most of this value is outside the market and best considered as non-tradable public benefits. Building on this database, Schmidt et al. (2016), present global

wellbeing (Fioramonti, 2014). For the interested reader, there is a large volume of critical discussions of the utilitarian willingness-to-pay model, which is reviewed in Pascual et al. (2010). Another useful essay on this topic was provided by Parks and Gowdy

ostanza and Folke (1997) described three types of value for ES Costanza and Folke (1997) described three types of value for ES and NC, based on the three sub-goals for sustainable wellbeing first atton; and (3) efficient allocation. Conventional economic 'willing ness-to-pay'' approaches are focused on the third of these goals using current individual preferences. But valuation with respect to the fairness and sustainability goals need very different approaches are in line with community or societal preferences and whole system sustainability issues (Table 3). In Gomez-Bassethun et al. Costanza et al. 2017 The understanding of the costanza et al. 2017 and the costanza et al. 2017 The understanding of the still hot sentenelly embedded in a costanza et al. 2018 In the broader approach, which explicitly includes nonmarket values, mostly from regulating and cultural services, is now being elaborated in many places with the aim to integrate the objectives of ecological sustainability, social justice, and process (Farley, 2012); Jacobs et al. 2016). Most provisioning services refer to most cultural services consist of a mix of private and public goods. Public goods are non-excludable and multiple users can simultaneously benefit from using them. This creates circumstances where aggregating

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Table 3 Valuation of ecosystem services based on the three primary goals of efficiency, fairness, and sustainability (Costanza and Folke, 1997).

	Cost or Value Basis	Who Votes	Preference Basis	Level of Discussion Required	Level of Scientific Input Required	Specific M		
<	Efficiency Fairness Sustainability	Homo economius Homo communicus Homo naturalis	Current individual preferences Community preferences Whole system preferences	Low High Medium	Low Medium High	Willingness feil of ignor Modeling wi		
				Øcrea		* 1ike *	ECSICO DI TOLI	TT

lonsiglio per la ricerca in agricoltura l'analisi dell'economia agrari

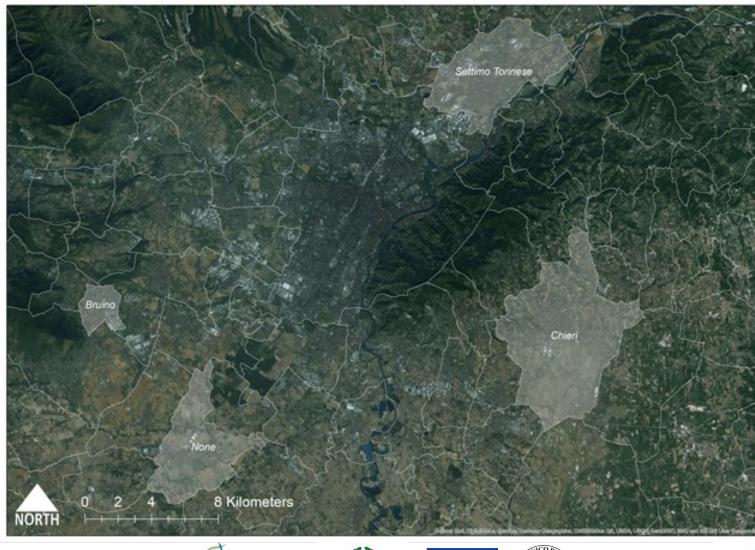






The study area

Bruino Chieri None Settimo Torinese



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LIFE SAM4CP



SOFTWARE INVEST

Habitat Quality is the ability of the ecosystem to <u>provide conditions appropriate</u> for individual and population persistence.

high quality = Habitat relatively intact and it's depends on a habitat proximity to human land uses and the intensity of these land uses.

integrated valuation of ecosystem services and tradeoffs InVEST has 17 models that valuate ES, both biophysical processes and processes with monetary/economic value. The results of this model is a <u>map of the geographic area</u>, >> land use/land cover (LULC) types .

Habitat quality Carbon storage and sequestration Water Yield: Hydropower production











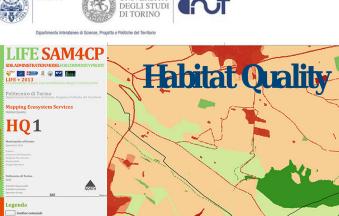


1.Qualità degli Habitat/Habitat QualitySupportin2.Sequestro del carbonio/Carbon SequestrationRegu3.Trattenimento dell'acqua/Water YieldRegu4.Purificazione dell'acqua/Nutrient RetentionRegu5.Trattenimento dei sedimenti/Sediment RetentionRegu6.Impollinazione/PollinationProvisioning ES7.Produttività agricola/Crop productionProvision

Supporting ES Regulating ES Regulating ES Regulating ES oning ES Provisioning ES

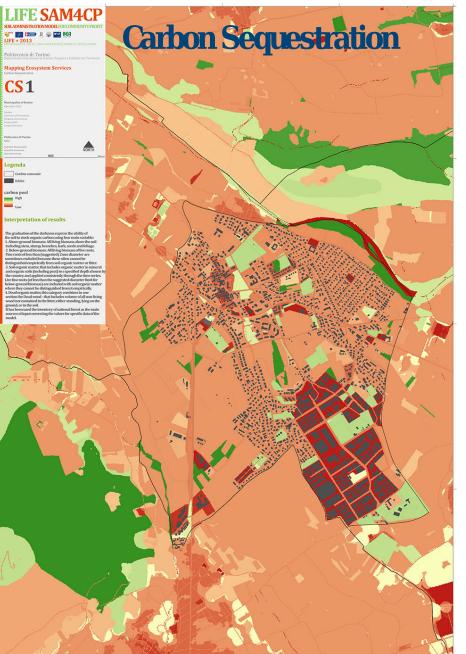














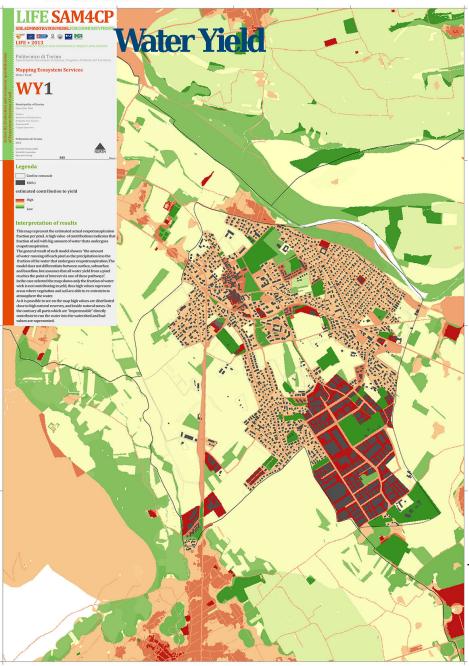




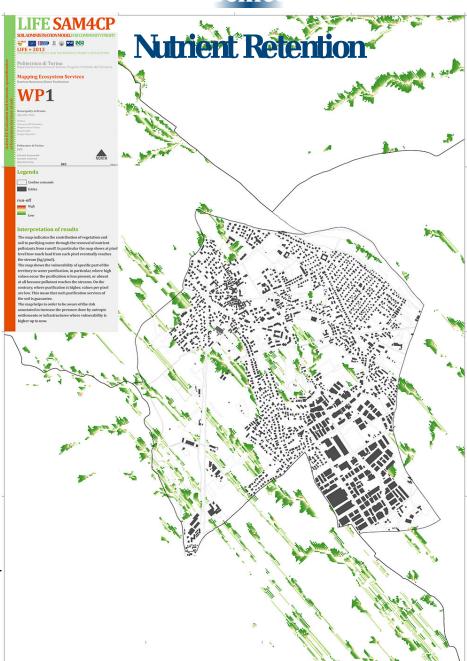
architetti



mento Interateneo di Scienze, Progetto e Politiche del Territorio













architetti

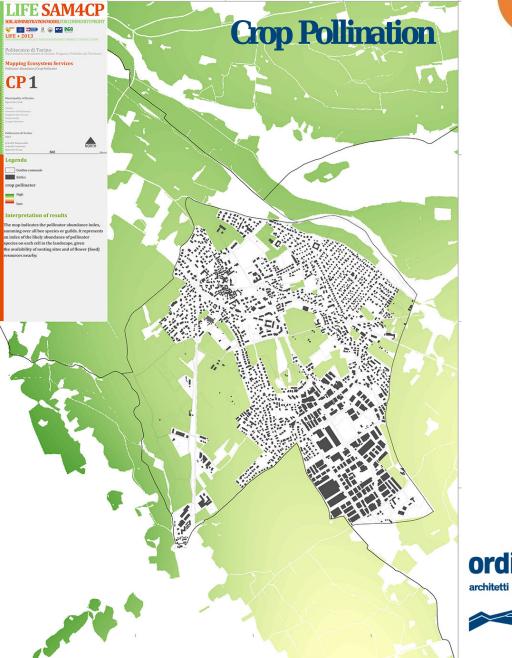


LIFE SAM4CP **Sediment Retention** SOILADMINISTRATION MODEL FOR COP SR1 1118 I in the original land cover without the ars applied from the RKLS at to the soil loss for bare soil. High val



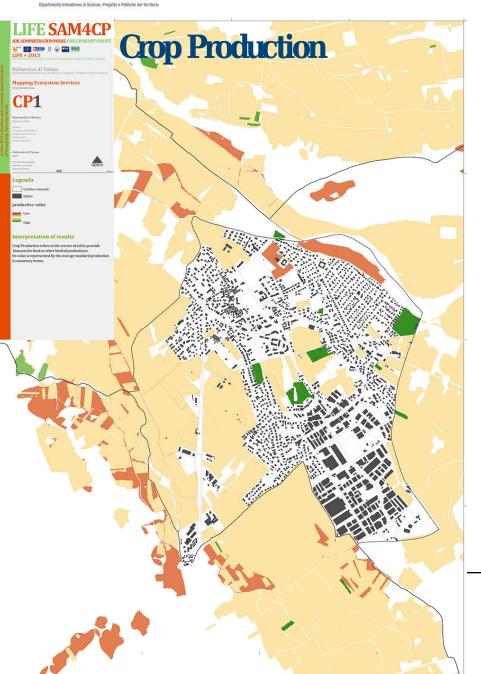














1.Habitat Quality 2. Carbon Sequestration **3.Water Yield 4. Nutrinet Retention 5. Sediment Retention 6.Crop Pollination 7.Crop Production**





Jra_

la rete di Bruino



NTA ART. 14 TER NORME PER LA RETE ECOLOGICA LOCALE

- Consolidamento e sviluppo della rete ecologica
- Disposizioni generali per la Rete Ecologica Locale
- Ambiti di conservazione degli elementi caratterizzanti il paesaggio
- Tutela e sviluppo del verde urbano
- Sistema dei servizi
- Sistema del verde privato pertinenziale
- Disposizioni operative per i comparti di perequazione urbanistica ed ambientale
- Mitigazioni e compensazioni
- Sanzioni







Ecosystem Services	Output	Distribution	Indicator	Biophysic Value	Economic Value
Habitat Quality		Entire territory	index 0 to 1	Weighted average of values for each LULC class Formula: Σ val bio * mq / mq tot (LULC class)	Stated preferences contingent value using questionnaires to evaluate the willingness to pay for conserve/improve natural areas in the context of study. [€/mq
Carbon Sequestration		Entire territory	stocked ton per pixel	Sum of values for each LULC class Formula: ∑ val bio * mq (LULC class) / 25 (mq pixel)	Market value for each tons of carbo sequestered it is associated the value of fiscal fees to compensate for CO_2 emission (LIFE VIMINE - LIFE12 NAT/IT/001122). [100 \in /t
Water Yield	Raster file with biophysic values distributed to the context of study. LULC map with precision of 1:2.000	Entire territory	evapotenspired mm per pixel	Sum of values for each LULC class Formula: ∑ val bio * mq (LULC class) / 25 (mq pixel)	Sostitution cost artificial water contro system of floodings (Prezzario oper Piemonte) [12,6 €/mo
Water Purification	scale and thematic accuracy at 4 level CLC has been use for input distribution in the	Entire territory	Kg of Nitrogen per pixel	Sum of values for each LULC class Formula: ∑ val bio * mq (LULC class) / 25 (mq pixel)	Sostitution cost system of natural purification (LIFE VIMIN - LIFE12 NAT/IT/001122) [64 €/kg
Sediment Retention	municipalities of Bruino, Settimo Torinese, Chieri, None. Output is of 5 per 5 pixel meters cell	Entire territory	ton of erosion per pixel	Sommatoria dei valori per classe d'uso del suolo Formula: Σ val biofisico * mq (classe d'uso) / 25 (mq pixel)	Avoided cost Soil fertility restoration costs (MGN Making Good Natura) [22,8€/
Crop Pollination		Only agricultural areas	n. of pollinator species per pixel	Sommatoria dei valori per classe d'uso del suolo Formula: Σ val biofisico * mq (classe d'uso) / 25 (mq pixel)	Market price Application of vulnerability index for agricultural productions (Gallai N., Salles J.M., Settele J., Vaissière B.E., 2009) and estimation of economic value of pollinator dependent production. [€/mc
Crop Production		Only agricultural areas (non generated by Invest)	€ per mq	Weighted average of values for each LULC class	Market price Standard Production of each agricultura land use
				Formula: \sum val bio * mq / mq tot (LULC class)	[€/mc







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• Immaginiamo che per finanziare azioni di mantenimento e incremento di aree boscate e seminaturali sia richiesto un contributo economico ai residenti nella forma di una tassa una tantum per nucleo familiare da versare al comune, quanto saresti disposto a pagare per tale tassa?

□ 0 € □ Altro: _____

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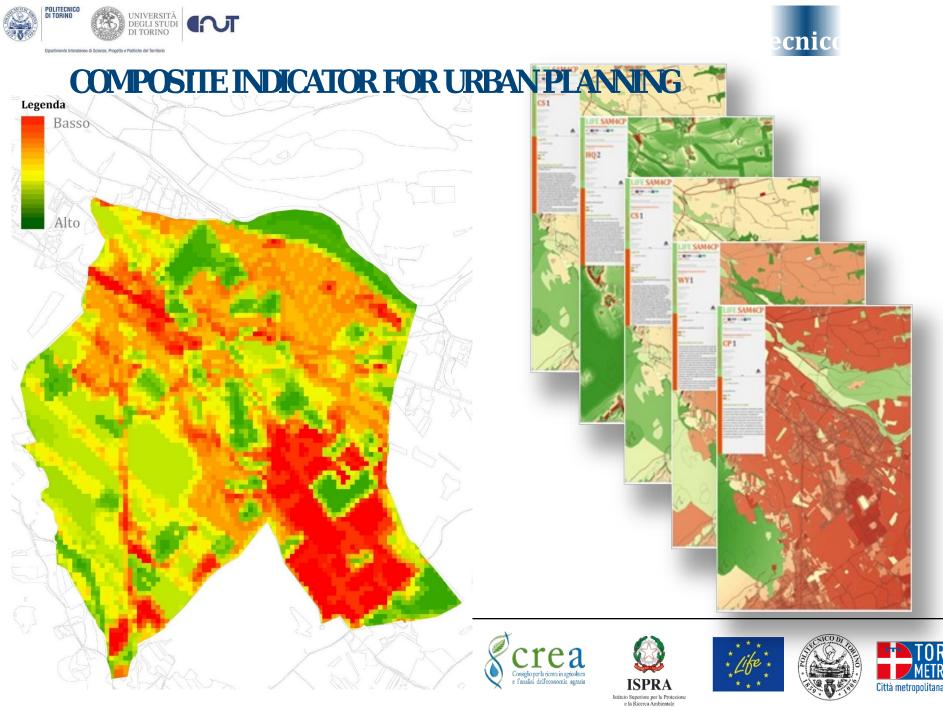














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Index given by the sum of the individual indices that generate a cumulative value of 1 (good quality) or 0 (poor quality)

indicatore dato dalla somma dei singoli indicatori che genera un valore cumulativo tendente ad 1 (buona qualità) o a 0 (cattiva gualità)





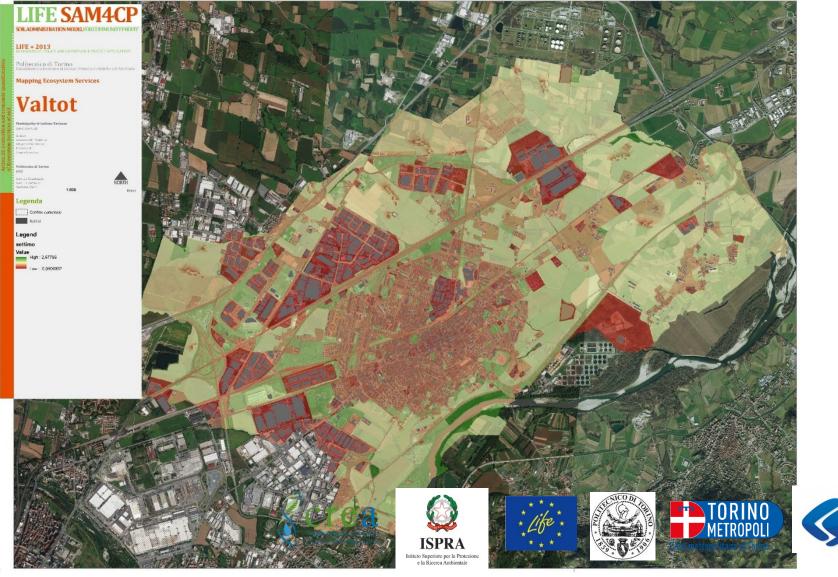








COMPOSITE INDICATOR FOR URBAN PLANNING





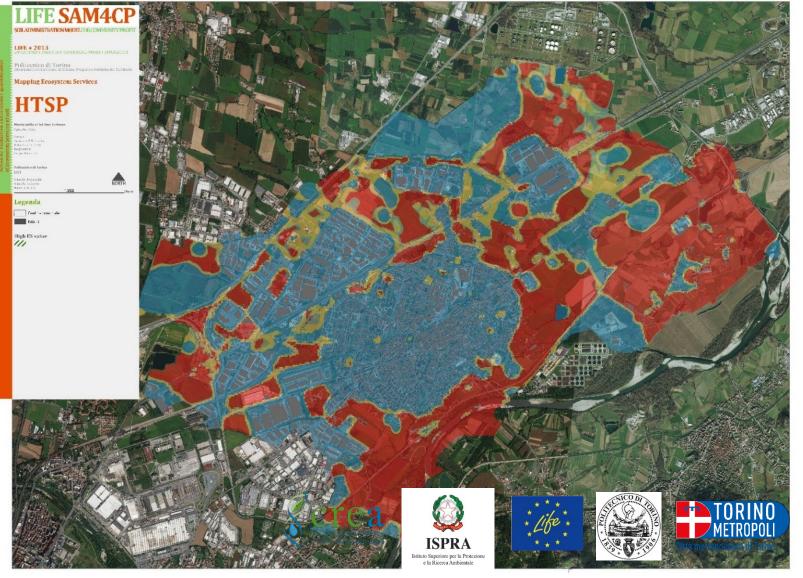




LIFE SAM4CP SOIL ADMINISTRATION MODEL FOR COMMUNITY PROFIT



COMPOSITE INDICATOR FOR URBAN PLANNING



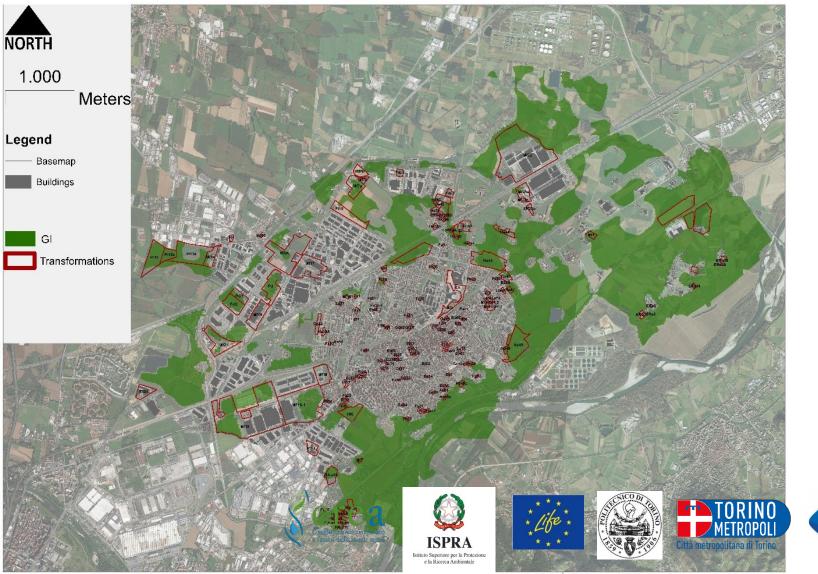


















Guidelines on how to limit, mitigate and compensate for soil sealing (European Commission, SWD(2012) 101, 12 April 2012

LIMITATION Of predicted LUC



COMPENSATION

of predicted LUC

Responce index MITIGATION









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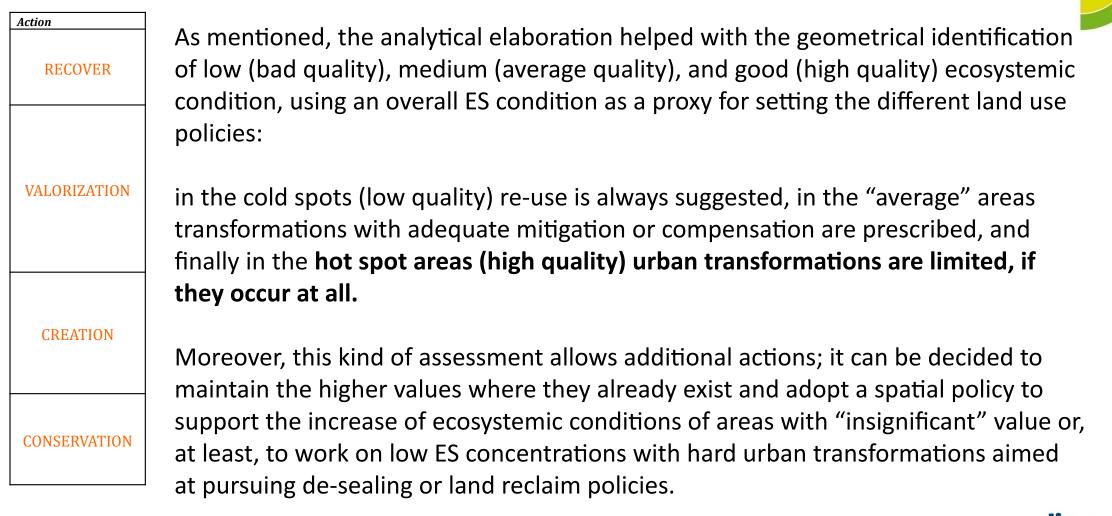








Which is the suitable intervention?













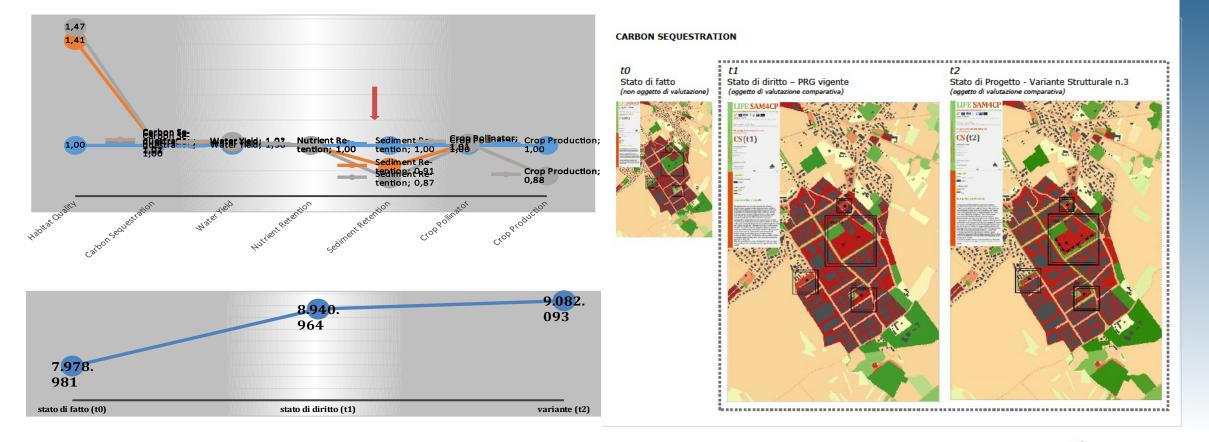




SOIL ADMINISTRATION MODEL FOR COMMUNITY PR



LIFE SAM4CP: The methodology has been used to set the Strategic Environmental Assessment



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