What can we sell behind timber production?

The role of forest externalities in the Eastern Alps for implementing payment for environmental service schemes

The Biennial Meeting of the Scandinavian Society of Forest Economics
23–26 May 2012,
Hyytiälä, Finland

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25 May, 2012

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Newforex
New ways to value and market forest eXternalities

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Outlines

1. The context
2. PES background
3. ES valuation: an application based on the Choice Experiments
4. Two (three) PES cases
5. Conclusion

1.The context

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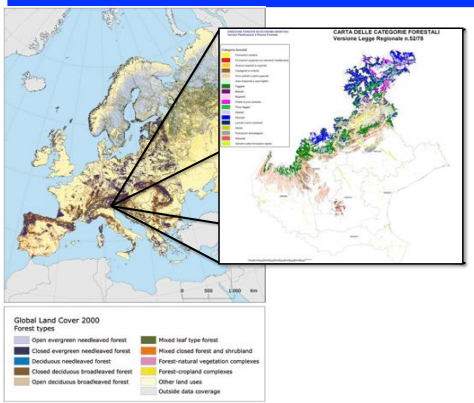
Case study area: mountain forests in the Eastern Alps



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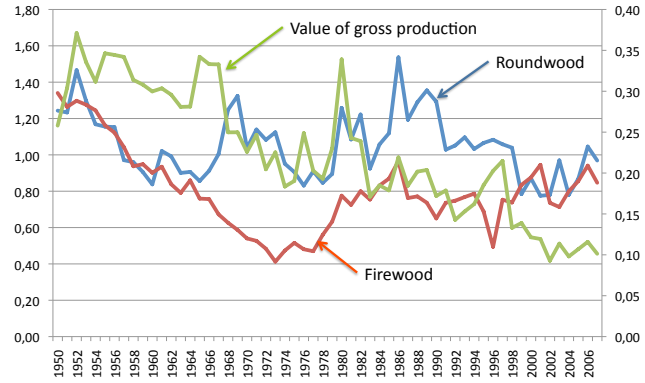
Timber and wood biomass prod. in the Italian Eastern Alps



Source: ISTAT 2010, modif.

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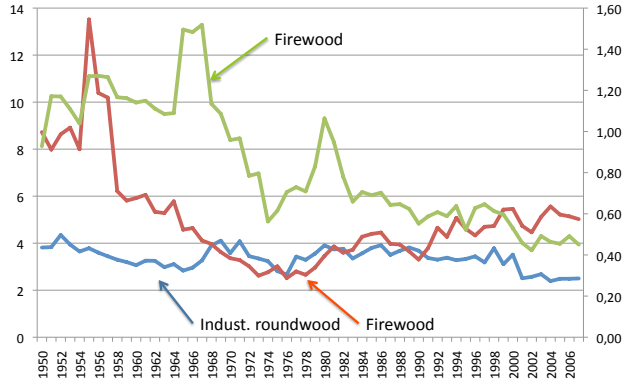
Timber and wood biomass prod. The Italian context



Source: ISTAT 2010, modif.

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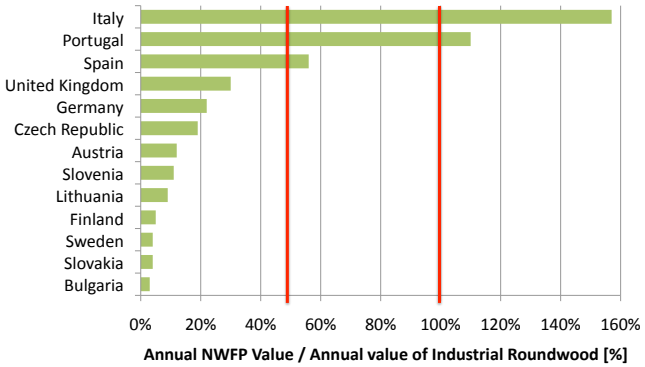
Non-Wood Forest Prod. Italian context



Source: Forest Europe 2011, modif.

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Tourist statistics in the Italian Eastern Alps

Veneto's annual tourist statistics (2010)

Touristic area	Arrivals*	%	Presence**	%
Sea	3,875,418	24.58	26,485,634	41.77
Art Cities	8,106,706	51.42	17,833,398	28.13
Lake	2,194,841	13.92	10,750,247	16.96
Mountain	**960,181**	**6.09**	**5,338,552**	**8.42**
Terms	628,482	3.99	2,993,162	4.72
Total	15,765,628	100	63,400,993	100

* Total number of single overnight in hotels, hostel, camping, B&B, etc.
** Total number of nights over-two-night-stay in hotel, hostel, camping, B&B, etc.

Source: Veneto-STAT 2010, modif.

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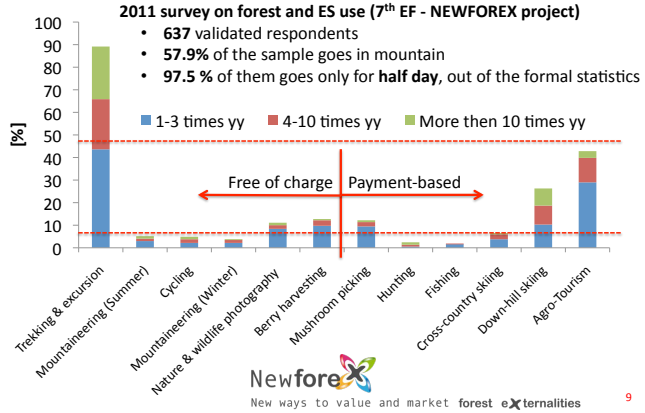
Forest recreation in the Eastern Italian Alps

2011 survey on forest and ES use (7th EF - NEWFOREX project)

- **637** validated respondents
- **57.9%** of the sample goes in mountain
- **97.5 %** of them goes only for **half day**, out of the formal statistics



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New ways to value and market forest externalities

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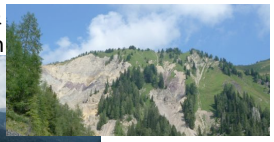
Forest externalities in the Eastern Italian Alps

Carbon sequestration

Landscape scenic view

Biodiversity conservation

Soil erosion & water quality prevention



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2. Payment for Environmental Services (PES)

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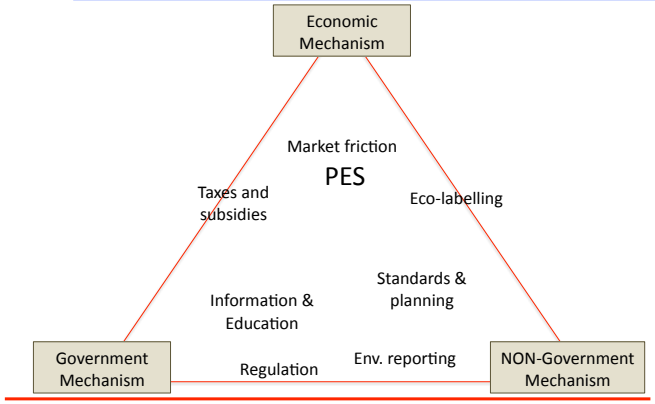
Env. resource management (ERM): principles



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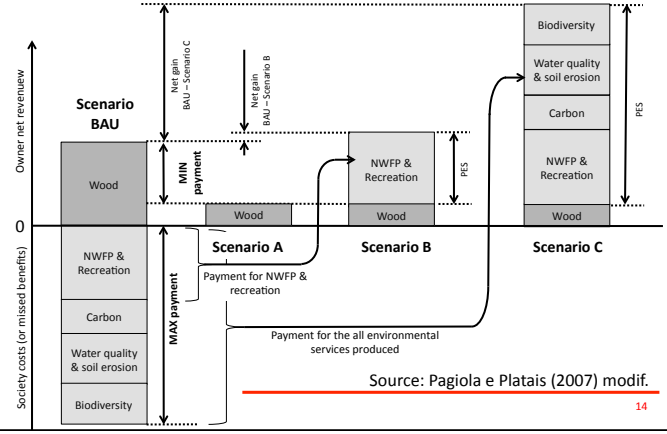
Payment for Env. Services: basic principles

Definition of PES
(Wunder 2005)

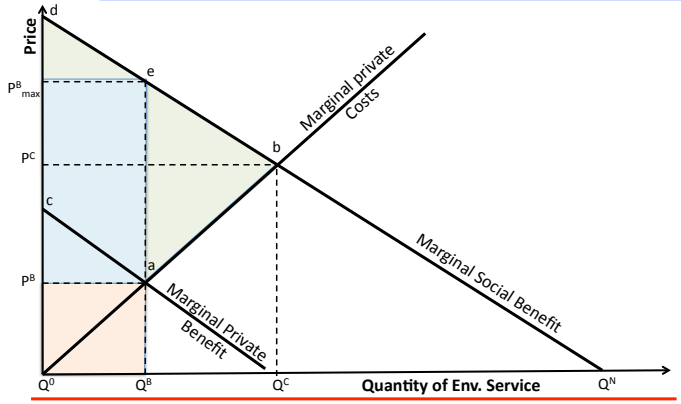
1. A ***voluntary*** transaction where
2. a ***well-defined*** ES (or a land-use likely to secure that service)
3. is being "bought" by a (minimum one) ES ***buyer***
4. from a (minimum one) ES ***provider***
5. if and only if the ES provider secures ES provision (***conditionality***).

Payment for Env. Services: some scenarios



Source: Pagiola e Platais (2007) modif.

Payment for Env. Services: basic principles



3. ES value: an application based on the Choice Experiments

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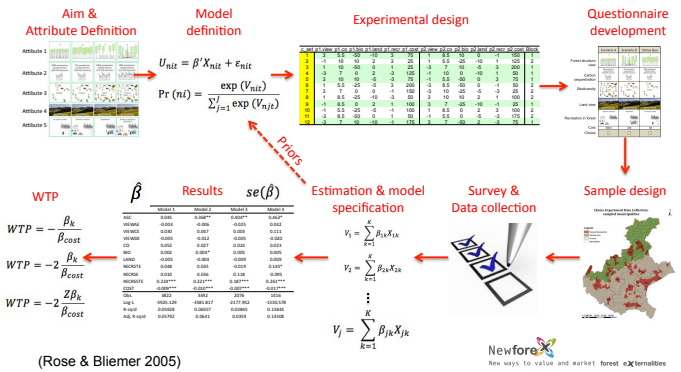
7th EF - NEWFOREX project
Choice Experiment application



(Rose & Bliemer 2005)

Legend: U= utility β= coefficient vector X = vector of attributes ε = error term n = respondent i = chosen alternative t = n. of choice tasks j = n. of alternatives k = attribute number z = socio-demographic parameters

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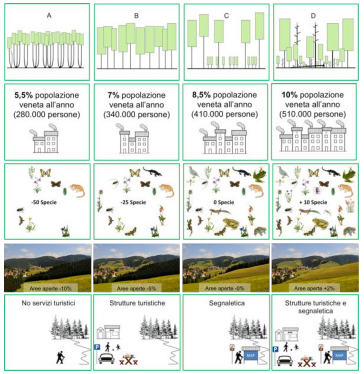
Attributes

1. Forest structure view
2. Carbon sequestration
3. Biodiversity
4. Land view
5. Recreation in forest



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	Scenario A	Scenario B	Status Quo
Forest structure view	A	D	B
Carbon sequestration	7% popolazione veneta all'anno (340.000 persone)	7% popolazione veneta all'anno (340.000 persone)	5,5% popolazione veneta all'anno (280.000 persone)
Biodiversity	+ 10 Specie	-25 Specie	-50 Specie
Land view	Aree aperte -0%	Aree aperte -10%	Aree aperte -5%
Recreation in forest	Strutture turistiche	Segnaletica	No servizi turistici
Cost	200 €	25€	0€
Choice	☐	☐	☐

12 Choice Tasks = 2 blocks x 6 Choice tasks

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Sample design

10% of the total municipalities has been sampled
Three strata:

- Mountain-Plain
- Municipality inhabitants
- Class age

Size of municipal population	PROVINCE							Number of interviews
	VR	VI	BL	TV	VE	PD	RO	
0-5,000	**21**	**27**	**12**	**19**	4	21	13	117
5,000-10,000	27	**30**	**5**	21	14	33	3	156
10,000-100,000	47	52	**6**	56	71	51	11	294
Capital town	35	17	**5**	12	37	31	7	144
Total	130	126	28	131	126	136	34	711

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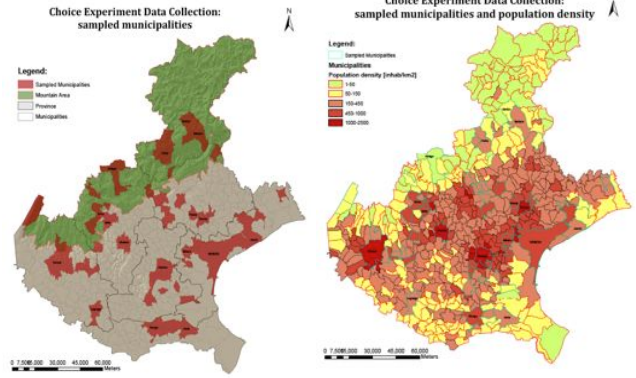
Sample design



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The models

Utility function

$$U_n = b_{0n} + b_{1n}viewA_n + b_{2n}viewC_n + b_{3n}viewD_n + b_{4n}CO2_n + b_{5n}bio_n + b_{6n}land_n + b_{7n}recrST_n + b_{8n}recrS_n + b_{9n}recrSST_n + b_{10n}cost_n$$

Multi-nomial Logit
- main effect
- second order interaction

$$\Pr(ni) = \frac{\exp(V_{nit})}{\sum_{j=1}^{J}\exp(V_{njt})}$$

Latent Class Model
- Classes based on education, income, place

$$\Pr(ni) = \sum_{m=1}^{M} s_m \left(\frac{\exp(b'_m x_{nit})}{\sum_j \exp(b'_m x_{njt})} \right)$$

$$s_m = \frac{\exp(\lambda_s Z_n)}{\sum_{s=1}^{S}\exp(\lambda_s Z_n)}$$

Legend: U= utility B= coefficient vector X = vector of attributes ε = error term n = respondent i = chosen alternative t = n. of choice tasks j = n. of alternatives k = attribute number Z = socio-demographic parameters s_m = probability to belong to segment b = [1,2,...,B]

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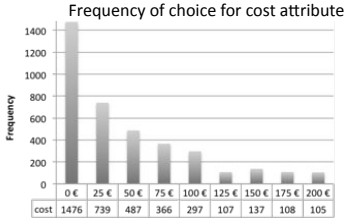
MNL preliminary results

	Model 1
ASC	0.045
VIEWA	-0.003
VIEWC	0.030
VIEWD	-0.005
CO2	0.052
BIODIVERSITY	0.002
LANDSCAPE	-0.005
RECRST	0.048
RECRS	0.010
RECRSST	0.224***
COST	-0.009***
Obs.	3822
Log-L	-3925.129
R-sqrd	0.05928
Adj. R-sqrd	0.05792

	Number of respondents	[%] of protesters	[%] of the sample
It is too costly	55	90.2	8.6
have no enough money	58	95.1	9.1
pay enough taxes	61	100.0	9.6
prefer to spend my money in other things	56	91.8	8.8
The program is not important	35	57.4	5.5
I don't believe it'll be implemented	38	62.3	6.0
Other programs could be better	29	48.3	4.6
I want to leave things like they are now	31	50.8	4.9

Frequency of choice for cost attribute



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MNL preliminary results: effect coded variable

	Model 1
ASC	-0.190
VIEWA	0.045
VIEWC	0.116
VIEWD	-0.143**
CO2 7%	0.254**
CO2 8.5%	-0.298***
CO2 10%	0.347**
BIO -25	0.077
BIO 0	0.122
BIO 10	-0.117
LAND -10%	-0.071
LAND 0%	0.111
LAND 2%	-0.089
RECRST	0.013
RECRS	0.018
RECRSST	0.309***
COST	-0.008***
Obs.	3822
Log-L	-3896.925
R-sqrd	0.06604
Adj. R-sqrd	0.06396

Whole population | No protesters | Mountain user | Mountain non-user | Education effect

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Willingness To Pay (WTP)

	Model 1	Model 2	Model 3	Model 4	Model 5
ASC	0	0	0	0	0
VIEWA	0	0	0	0	0
VIEWC	0	0	0	0	31.77
VIEWD	0	0	0	0	0
CO7	59.11	71.47	0	85.02	40.74
CO85	0	0	0	0	0
CO10	80.88	0	191.61	96.18	0
BIO25	0	0	0	75.82	0
BIO0	0	36.42	0	0	28.95
BIO10	0	0	0	0	23.00
LAND10	0	0	0	0	0
LAND0	0	0	0	0	0
LAND2	0	0	0	0	0
RECRST	0	0	0	0	0
RECRS	0	0	0	0	207.34
RECRSS	71.90	63.70	113.33	95.75	242.54
	Whole population	No protesters	Mountain user	Mountain non-user	Education effect on the whole pop.

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Some evidences on CE results

According to the these results, the aggregate WTP might wave from 29 M€/yy to 550 M€/yy. Is it reliable?

Other studies have shown similar results in the same area (208 M€ - Tempesta et al. 2008)

WTP has deeply relate to education, while the high level of protest answer is a signal of potential un-compliance

Portion of population are more willing to support ES provision, hence target to them may help to support specific policy. Might be the case of PES scheme?

4. Two (three) PES examples

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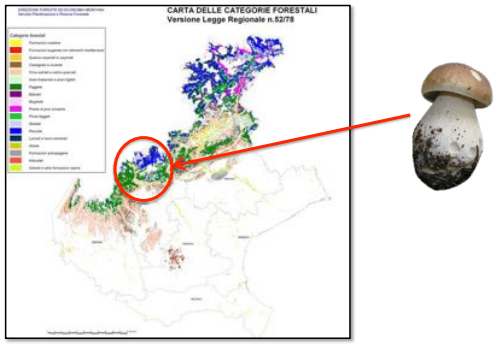
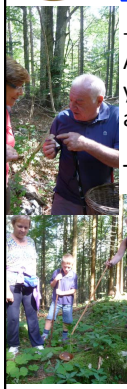
1- Forest recreation in Veneto region: the case of wild mushroom collection



1- Forest recreation in Veneto region: the case of wild mushroom collection



-100.000 ha of forest (manage by municipality technicians) - Annual revenue from WM picking at regional scale 2.5-9M€/yy (high variability linked to the summer rainfall) paid by approximately 200.000 recreational pickers

Three different management approaches:

- Command and control (C&C) → minimal control
- C&C →medium control
- MBM → direct linkage between forest manag. and wild mushroom (WM) collection demand:
  - Picking permit price based on the annual demand and forest WM provision
  - Need of demand and supply assessment

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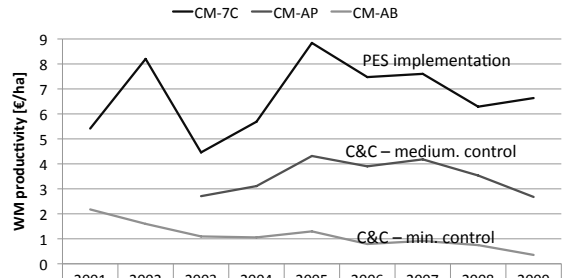
1- Forest recreation in Veneto region: The case of wild mushroom collection



Picking revenue €/ha	2001	2002	2003	2004	2005	2006	2007	2008	2009
CM-7C	5,4	8,2	4,5	5,7	8,8	7,5	7,6	6,3	6,6
CM-AP			2,7	3,1	4,3	3,9	4,2	3,5	2,7
CM-AB	2,2	1,6	1,1	1,1	1,3	0,8	0,9	0,7	0,4

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2- Water Relate Services: The implementation of Galli's act

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2- Water Relate Services: The implementation of Galli's act

- The majority of superficial land-slides are influenced by to land abandon.
- The soil erosion affect directly and indirectly the water quality
- The implementation of Galli's act stimulate the land stability adding to the water bill the 3%, fully reinvest in the upstream area maintenance.
- Active management of forest based on small project financing
- 1.09 M€ has been invest (implementation in 2010)

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3- Water Relate Services: The case of Romagna Acque

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3- Water Relate Services: The case of Romagna Acque

- Dam system with volume of 33 M m^3 manage by monopolistic public company
- Around 108 Mm^3 of tap annual water supply (50% of Romagna demand)
- Problem of soil erosion and water quality, and demand of high quality water
- A scientific evidence

Forest management practice	1° year Erosion [Kg/ha]	2° year Erosion [Kg/ha]	3° year Erosion [Kg/ha]	4° year Erosion [Kg/ha]	Total Erosion [Kg/ha]
Coppice	92,2	80,5	1,1	5,6	179,4
Coppice to stand-forest	62,7	24,1	0,8	4,4	92,0
Natural evolution	5,2	2,9	1,0	1,5	10,5

Source: (Bagnaresi et al. 1999) modif.

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3- Water Relate Services: The case of Romagna Acque

- Annual soil erosion (or dam volume reduction): 42,600 m3/yy
- The forest management change accounted for 10,000 m^3/yy
- From 1982 to 2009: 27 years of investment in the catchment basin (5,200 ha of forest): near 4% of the annual turnover, equal to 5-600,000 €/yy

  (the cost of removing the soil from the dam-bed was 10 times higher in the same period)

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5. Conclusion

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Conclusion

PES schemes may help ES enhancement, however we need to consider:

- Estimation on the value of a given ES looking to demand side → important role of the research
- Promote ES education → awareness of civil soc.
- New role of the government → form C&C to promoter of green market
- The transaction costs! Main "dam" between theory and practice.
- Need to promote the definition of ES property rights

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Any questions?

"An issue that can
NOT
be CLEARLY
measured
will be difficult
to improve"

(unknown, because too obvious)

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