How to mobilise expert capacities (and time) for implementing IUCN Red List assessments on Mediterranean Monocots

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3st Mediterranean Plant Conservation Week – 27 September / 1st October 2021 – Chania, Crete (Greece)

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1. The Mediterranean Hotspot

CEPF delimitation:

The Mediterranean Basin, including the western Zagros + Jordan valley and the near Atlantic coast + Macaronesian archipelagos

More than 20 countries (from Portugal to Iraq and from Cabo Verde to Jordan)

https://www.cepf.net/sites/default/files/mediterranean-basin-2017-ecosystem-profile-summary-english.pdf

1. The Mediterranean Hotspot

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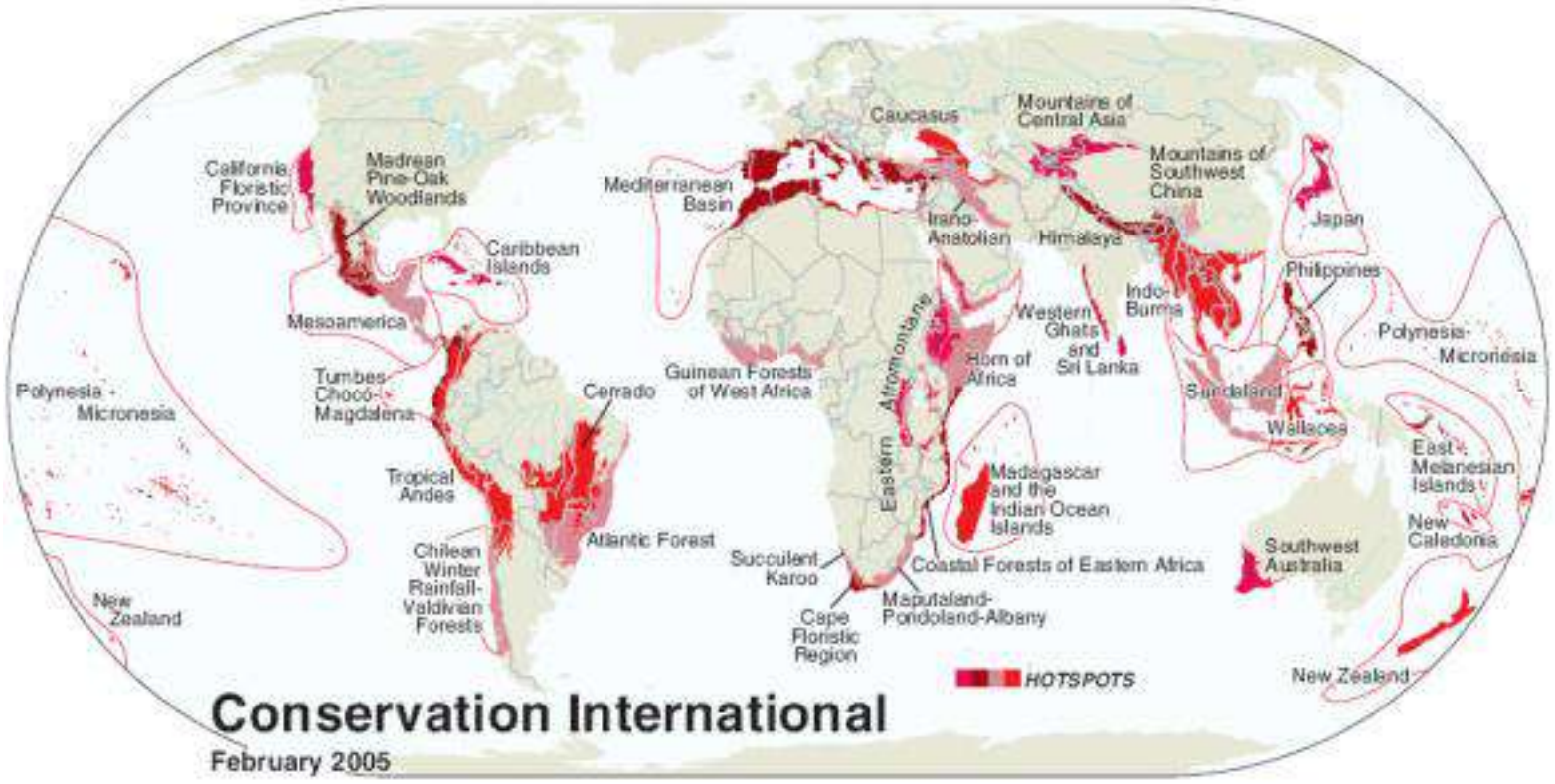
The Mediterranean Basin, including the western Zagros + Jordan valley and the near Atlantic coast + Macaronesian archipelagos

More than 20 countries (from Portugal to Iraq and from Cabo Verde to Jordan)

<u>3rd biodiversity hotspot for plants at global level :</u>

- nb of endemic species
- % ecosystem conversion
- anthropic threat level



https://www.bioaddict.fr/media/les-34-pots-chauds-hotspots-de-m5529.html

2. Plants in the Mediterranean

In the 1980's/1990's we estimated **25 000 – 30 000 plant species** in the Mediterranean Basin with around **50% endemic**
N.B.: Number still increasing through new species description or resurrection…

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In 2017 only 2300 had been evaluated for the IUCN Red List (9.2%)
Nowadays 2426 vascular plants and 1855 Bryophytes

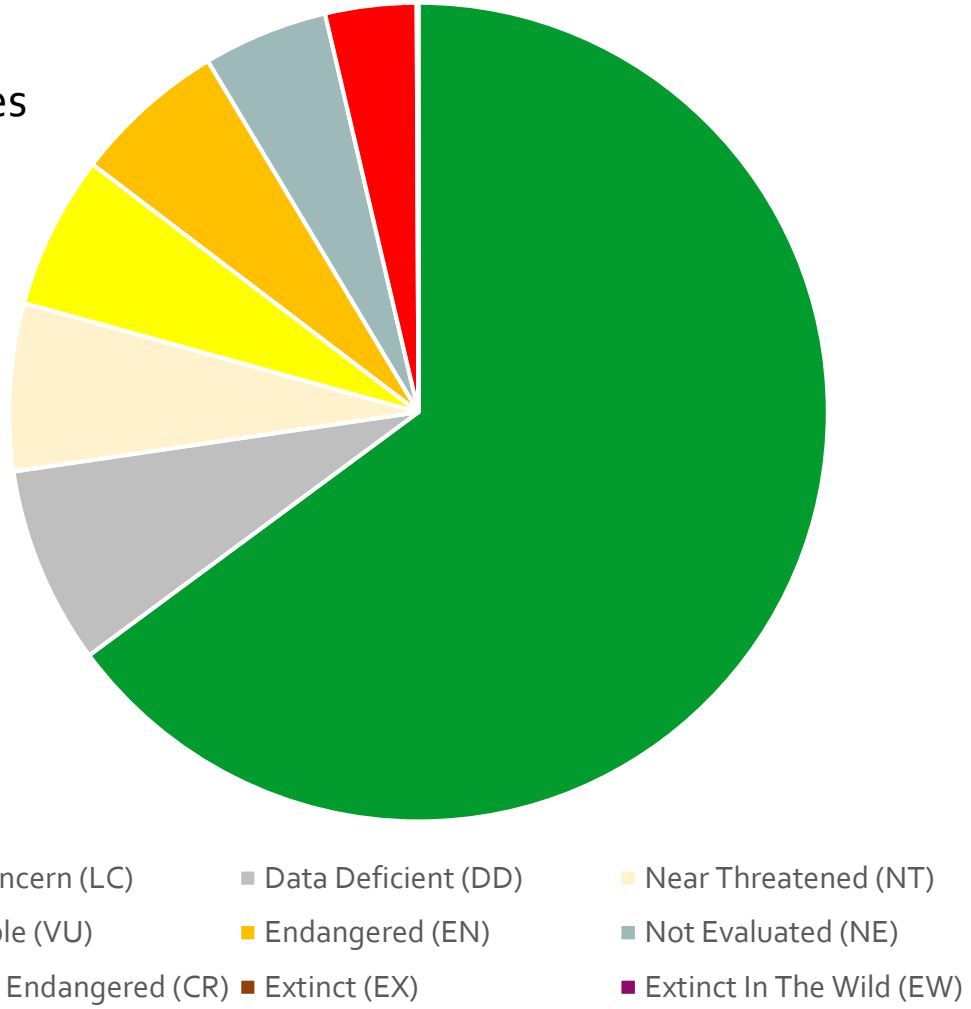
Row Labels	Count of Taxon
ANTHOCERATOPHYTA	9
Bryophyta	1368
CHAROPHYTA	3
MARCHANTIOPHYTA	474
Tracheophyta	2425
Grand Total	4279

3. The IUCN Red List

Mediterranean plants by IUCN Red List Categories

Row Labels	Count of Taxon
Extinct (EX)	2
Extinct In The Wild (EW)	1
Critically Endangered (CR)	154
Endangered (EN)	259
Near Threatened (NT)	283
Least Concern (LC)	2776
Vulnerable (VU)	259
Data Deficient (DD)	334
Not Evaluated (NE)	211
Grand Total	4279

16.5% Threatened species
8% Data Deficient



3. The IUCN Red List capacities

Specialist Groups (SG) and/or Red List Authorities (RLA) of the Species Survival Commission (SSC)
https://www.iucn.org/commissions/ssc-groups/plants-fungi/plants

Meditarrean Plant Specialist Group (70 expert members, RLA coord.: Errol Véla)

Macaronesian Island Plant Specialist Group (18 expert members, RLA coord.: Luís Silva)

+Turkey Plant Specialist Group (RLA only, 100 expert members, coord.: Özge Balkız, Hayri Duman & Ahmet Emre Yaprak)
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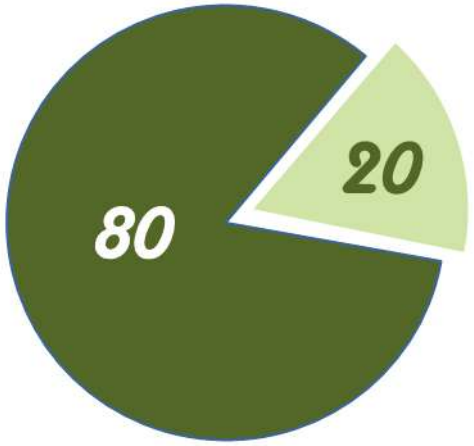
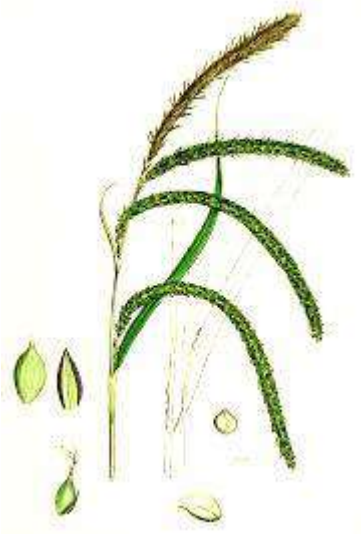
→ National committees from local initiatives for a lot of countries… but not all of them !

4. Mediterranean Monocots assessment

Around 20% of the Mediterranean flora are Monocots (around 5000?)
Around 50% of these could be endemic (around 2500?)



→ Monocots…



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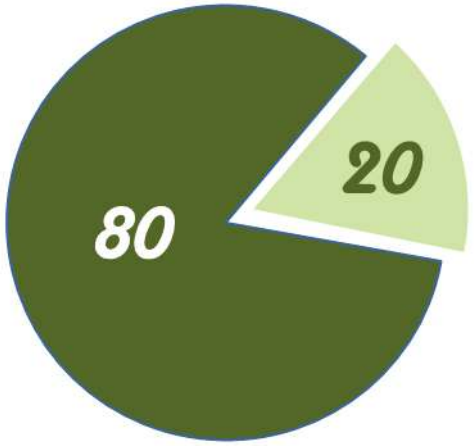


A previous funded project (2015-2017):
3 workshops, >50 experts, 4 managers…

A provisional checklist of 1446 (near-)endemic species was built:
Out of the 1446 species identified, only 602 have already been evaluated
→ 844 drafts still need assessment

Orchids: 59 (assessed) / 141 (total endemics)
Alliums: 97 (assessed) / 210 (total endemics)

	PUBLISHED	NOT PUBLISHED	Grand Total
ALISMATALES	2	1	3
ALISMATACEAE	2	1	3
ARALES	15	20	35
ARACEAE	15	20	35
ARECALES	1	1	2
PALMAE	1	1	2
COMMELINALES	1		1
COMMELINACEAE	1		1
CYPERALES	128	281	409
CYPERACEAE	18	13	31
GRAMINEAE	110	267	377
POACEAE	0	1	1
JUNCALES	17		17
JUNCACEAE	17		17
LILIALES	389	431	820
ALLIACEAE	97	133	230
AMARYLLIDACEAE	60	8	68
APHYLLANTHACEAE	1		1
ASPARAGACEAE	17	2	19
ASPHODELACEAE	8	14	22
COLCHICACEAE	15	51	66
DIOSCOREACEAE	2		2
HYACINTHACEAE	27	140	167
IRIDACEAE	88	53	141
LILIACEAE	73	29	102
MELANTHIACEAE	1		1
RUSCACEAE	0	1	1
NAJADALES	5	3	8
JUNCAGINACEAE	0	2	2
POSIDONIACEAE	1		1
POTAMOGETONACEAE	4	1	5
ASPARAGALES	62	86	148
AMARYLLIDACEAE	2	1	3
ASPARAGACEAE	1	2	3
HYACINTHACEAE	0	1	1
ORCHIDACEAE	59	82	141
POALES	1	1	2
POACEAE	1	1	2
ASTERALES	0	1	1
ASTERACEAE	0	1	1
Grand Total	620	825	1446

5. Main problems and limitations

What **taxonomic reference** to follow ?

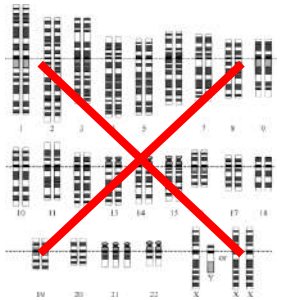
Unsolvable question… → **Fluctuating taxonomy** !

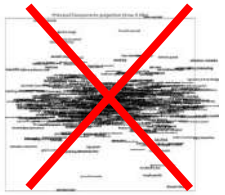
5. Species delimitation using fluctuating taxonomy (how and why)

1st property:

A taxon have to be **identifiable on the field**

→ no cryptic species (karyology, DNA, numerical…)





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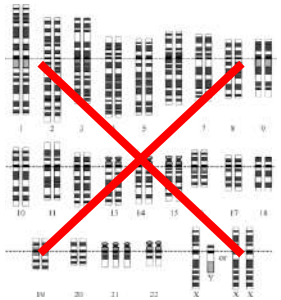
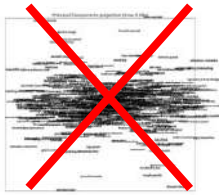
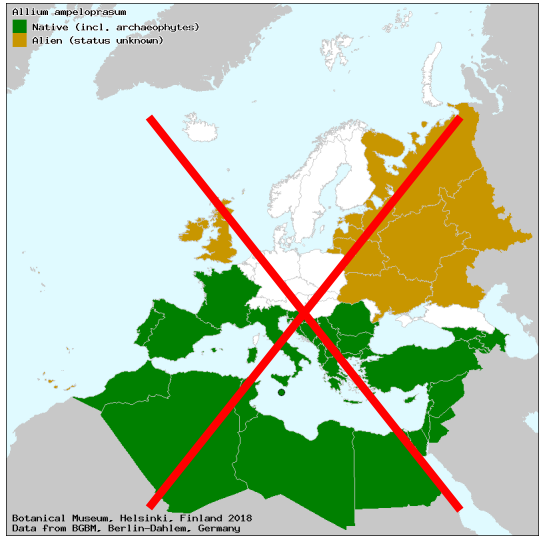




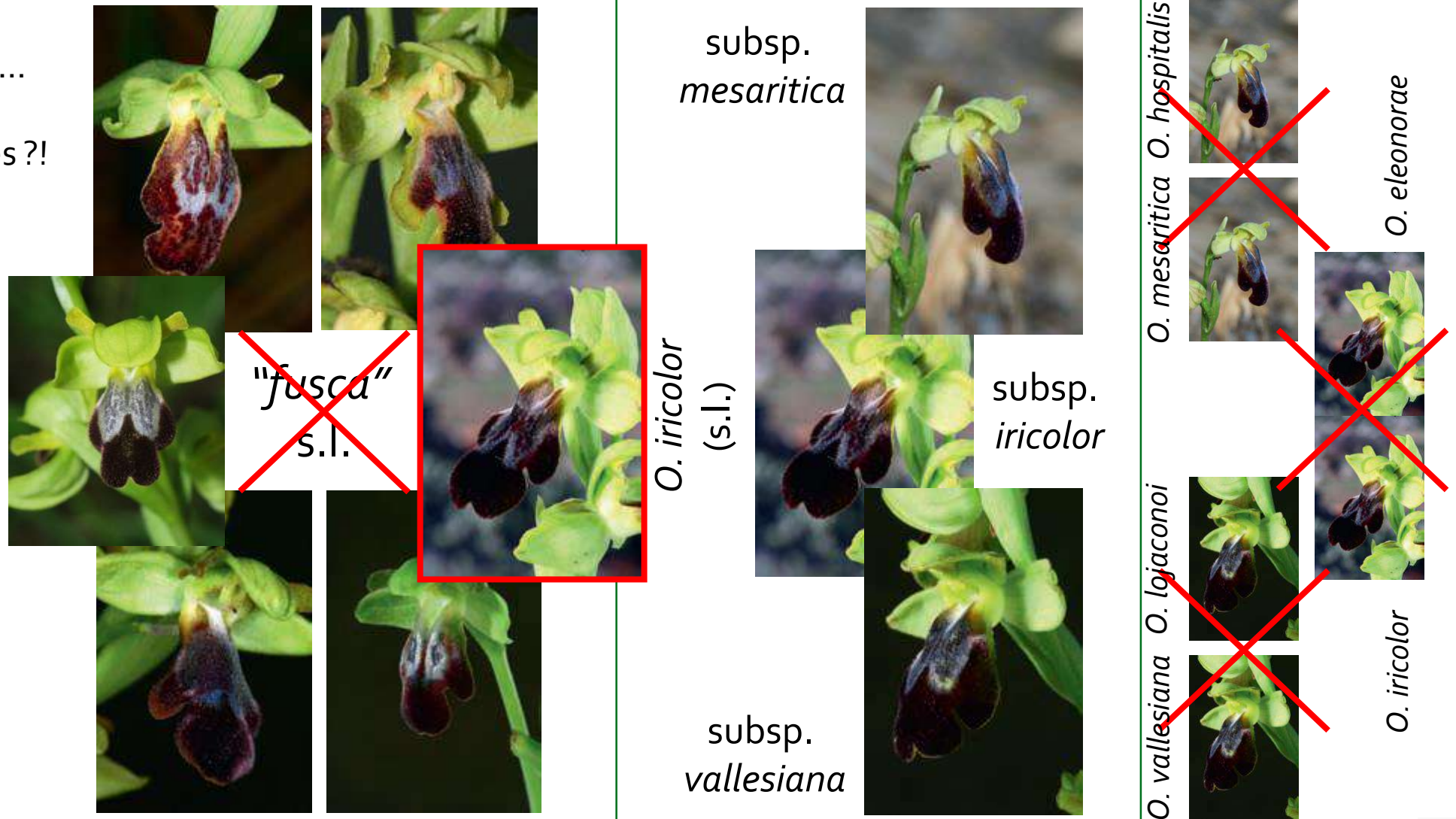
2nd property:
Have to share **homogenous conservation issues**
→ ex. *Allium ampeloprasum* s.s. versus s.l.



(around 10 species)

5. Species delimitation using fluctuating taxonomy (how and why)

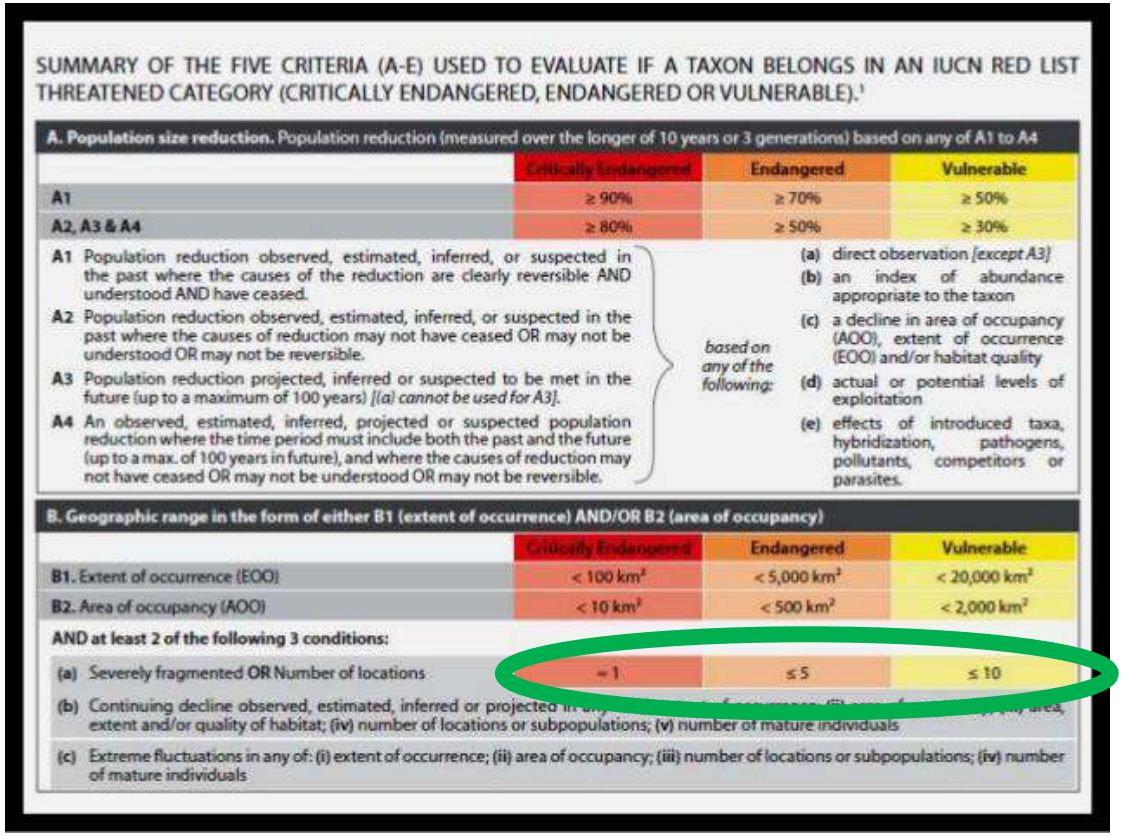
The *Ophrys* nightmare…
(*Orchidaceae*):
→ 20 // 70 // 300 species ?!



very lumper position → our compromise ← very splitter

5. Data heterogeneity or deficiency

1) lack of **quantitative data** (population, number of locations…);



SUMMARY OF THE FIVE CRITERIA (A-E) USED TO EVALUATE IF A TAXON BELONGS IN AN IUCN RED LIST THREATENED CATEGORY (CRITICALLY ENDANGERED, ENDANGERED OR VULNERABLE).[1]

A. Population size reduction. Population reduction (measured over the longer of 10 years or 3 generations) based on any of A1 to A4

	Critically Endangered	Endangered	Vulnerable
A1	≥ 90%	≥ 70%	≥ 50%
A2, A3 & A4	≥ 80%	≥ 50%	≥ 30%

A1 Population reduction observed, estimated, inferred, or suspected in the past where the causes of the reduction are clearly reversible AND understood AND have ceased.

A2 Population reduction observed, estimated, inferred, or suspected in the past where the causes of reduction may not have ceased OR may not be understood OR may not be reversible.

A3 Population reduction projected, inferred or suspected to be met in the future (up to a maximum of 100 years) *[(a) cannot be used for A3]*.

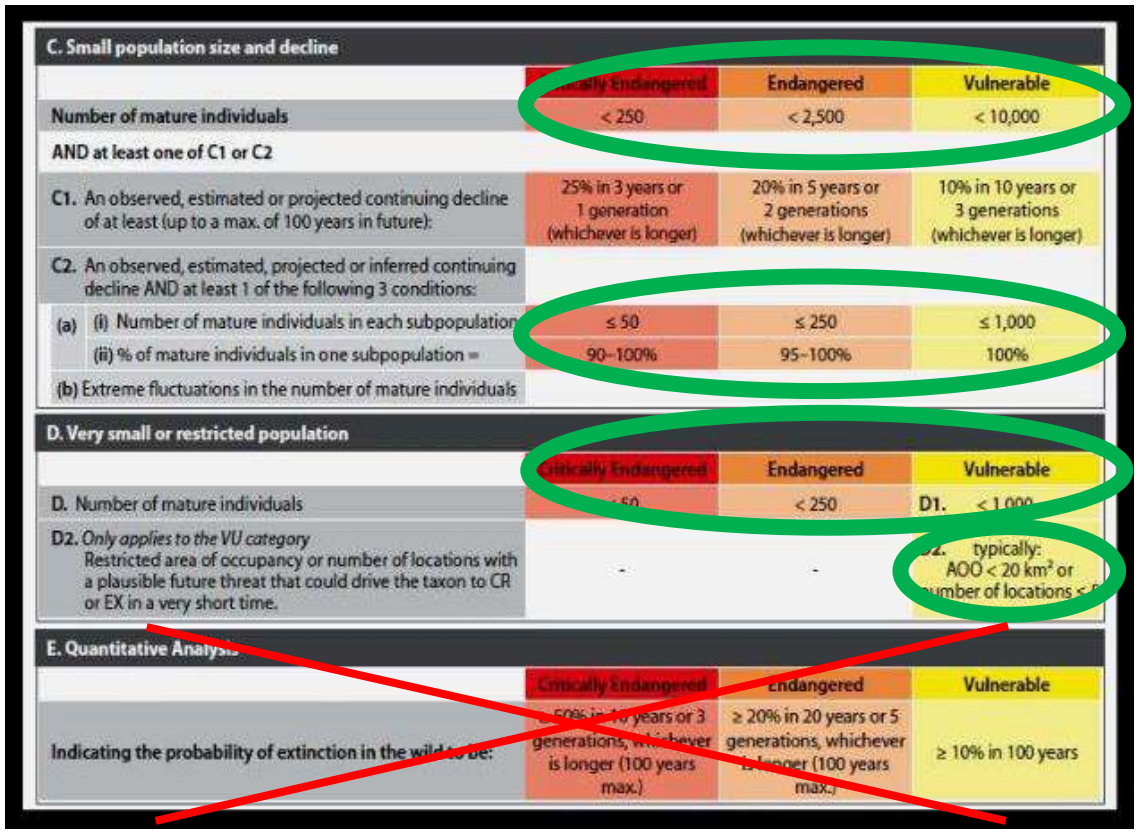
A4 An observed, estimated, inferred, projected or suspected population reduction where the time period must include both the past and the future (up to a max. of 100 years in future), and where the causes of reduction may not have ceased OR may not be understood OR may not be reversible.

based on any of the following:

(a) direct observation *[except A3]*
(b) an index of abundance appropriate to the taxon
(c) a decline in area of occupancy (AOO), extent of occurrence (EOO) and/or habitat quality
(d) actual or potential levels of exploitation
(e) effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites.

B. Geographic range in the form of either B1 (extent of occurrence) AND/OR B2 (area of occupancy)

	Critically Endangered	Endangered	Vulnerable
B1. Extent of occurrence (EOO)	< 100 km²	< 5,000 km²	< 20,000 km²
B2. Area of occupancy (AOO)	< 10 km²	< 500 km²	< 2,000 km²
AND at least 2 of the following 3 conditions:			
(a) Severely fragmented OR Number of locations	= 1	≤ 5	≤ 10
(b) Continuing decline observed, estimated, inferred or projected in … extent and/or quality of habitat; (iv) number of locations or subpopulations; (v) number of mature individuals			
(c) Extreme fluctuations in any of: (i) extent of occurrence; (ii) area of occupancy; (iii) number of locations or subpopulations; (iv) number of mature individuals			



C. Small population size and decline

	Critically Endangered	Endangered	Vulnerable
Number of mature individuals	< 250	< 2,500	< 10,000
AND at least one of C1 or C2			
C1. An observed, estimated or projected continuing decline of at least (up to a max. of 100 years in future):	25% in 3 years or 1 generation (whichever is longer)	20% in 5 years or 2 generations (whichever is longer)	10% in 10 years or 3 generations (whichever is longer)
C2. An observed, estimated, projected or inferred continuing decline AND at least 1 of the following 3 conditions:			
(a) (i) Number of mature individuals in each subpopulation	≤ 50	≤ 250	≤ 1,000
(ii) % of mature individuals in one subpopulation =	90–100%	95–100%	100%
(b) Extreme fluctuations in the number of mature individuals			

D. Very small or restricted population

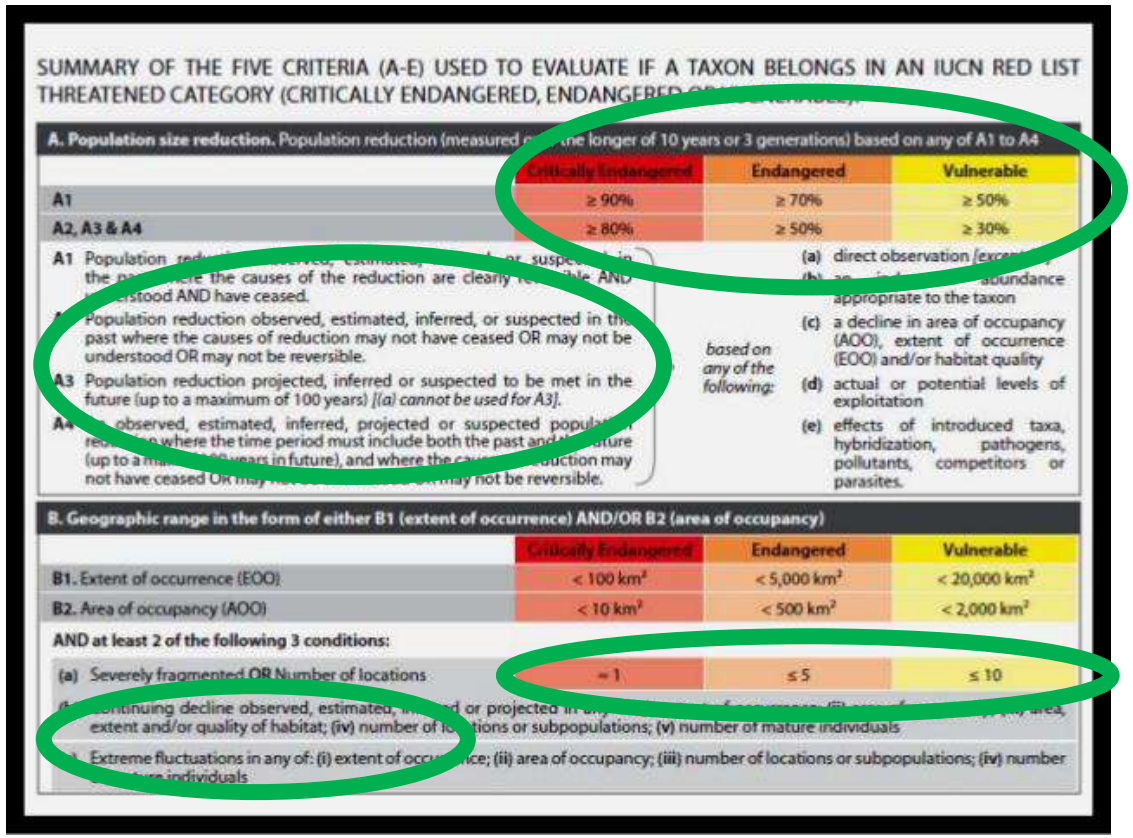
	Critically Endangered	Endangered	Vulnerable
D. Number of mature individuals	< 50	< 250	D1. < 1,000
D2. *Only applies to the VU category* Restricted area of occupancy or number of locations with a plausible future threat that could drive the taxon to CR or EX in a very short time.	-	-	D2. typically: AOO < 20 km² or number of locations ≤ 5

E. Quantitative Analysis

	Critically Endangered	Endangered	Vulnerable
Indicating the probability of extinction in the wild to be:	≥ 50% in 10 years or 3 generations, whichever is longer (100 years max.)	≥ 20% in 20 years or 5 generations, whichever is longer (100 years max.)	≥ 10% in 100 years

5. Data heterogeneity or deficiency

1) lack of **quantitative data** (population, number of locations…);
2) Lack of **historical data** (trends, decline ratio…);



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B. Geographic range in the form of either B1 (extent of occurrence) AND/OR B2 (area of occupancy)

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B2. Area of occupancy (AOO)	< 10 km²	< 500 km²	< 2,000 km²
AND at least 2 of the following 3 conditions:			
(a) Severely fragmented OR Number of locations	= 1	≤ 5	≤ 10

(b) Continuing decline observed, estimated, … or projected in … area, extent and/or quality of habitat; (iv) number of l… tions or subpopulations; (v) number of mature individuals

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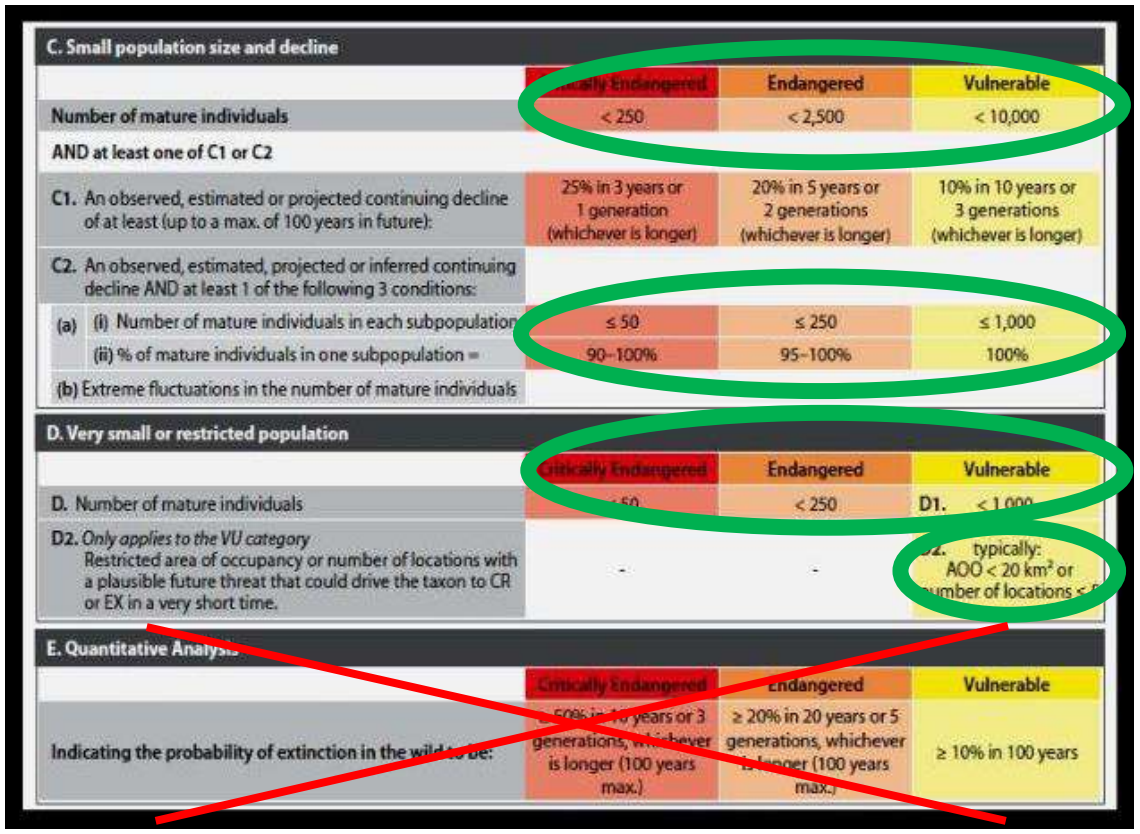

C. Small population size and decline

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Number of mature individuals	< 250	< 2,500	< 10,000
AND at least one of C1 or C2			
C1. An observed, estimated or projected continuing decline of at least (up to a max. of 100 years in future):	25% in 3 years or 1 generation (whichever is longer)	20% in 5 years or 2 generations (whichever is longer)	10% in 10 years or 3 generations (whichever is longer)
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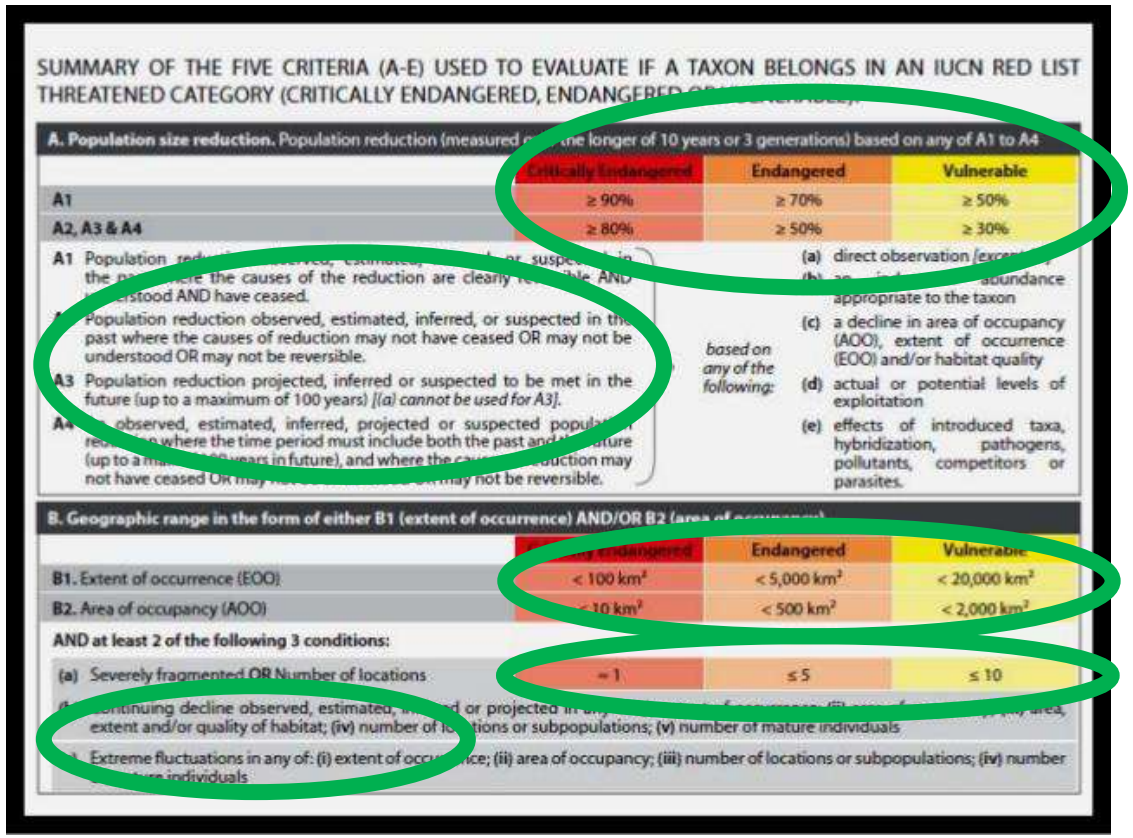
E. Quantitative Analysis

	Critically Endangered	Endangered	Vulnerable
Indicating the probability of extinction in the wild to be:	≥ 50% in 10 years or 3 generations, whichever is longer (100 years max.)	≥ 20% in 20 years or 5 generations, whichever is longer (100 years max.)	≥ 10% in 100 years

5. Data heterogeneity or deficiency

1) lack of **quantitative data** (population, number of locations…);
2) Lack of **historical data** (trends, decline ratio…);
3) Lack of **field knowledge** (distribution/EOO, distribution/AOO, threats…);



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B. Geographic range in the form of either B1 (extent of occurrence) AND/OR B2 (area of ...

	Endangered	Vulnerable
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B2. Area of occupancy (AOO)	< 500 km²	< 2,000 km²
AND at least 2 of the following 3 conditions:		
(a) Severely fragmented OR Number of locations	≤ 5	≤ 10

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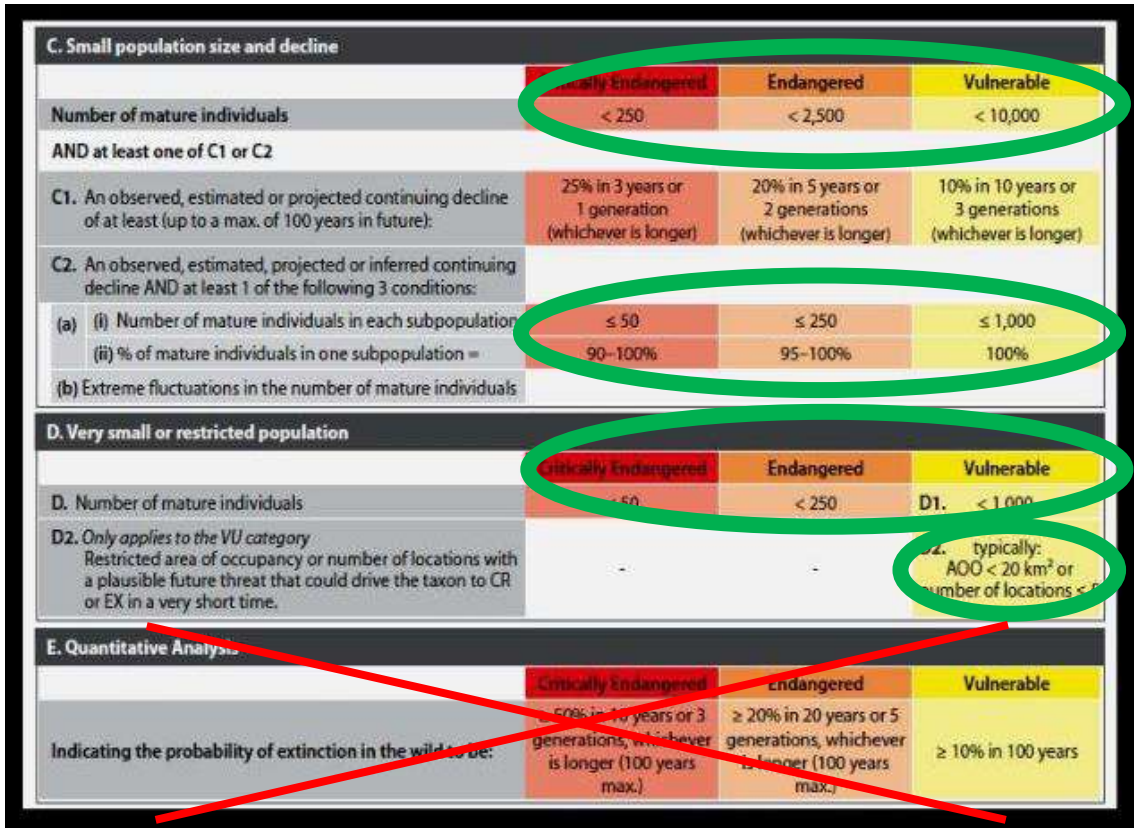

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E. Quantitative Analysis

	Endangered	Vulnerable
Indicating the probability of extinction in the wild to be:	≥ 20% in 20 years or 5 generations, whichever ... longer (100 years max.)	≥ 10% in 100 years

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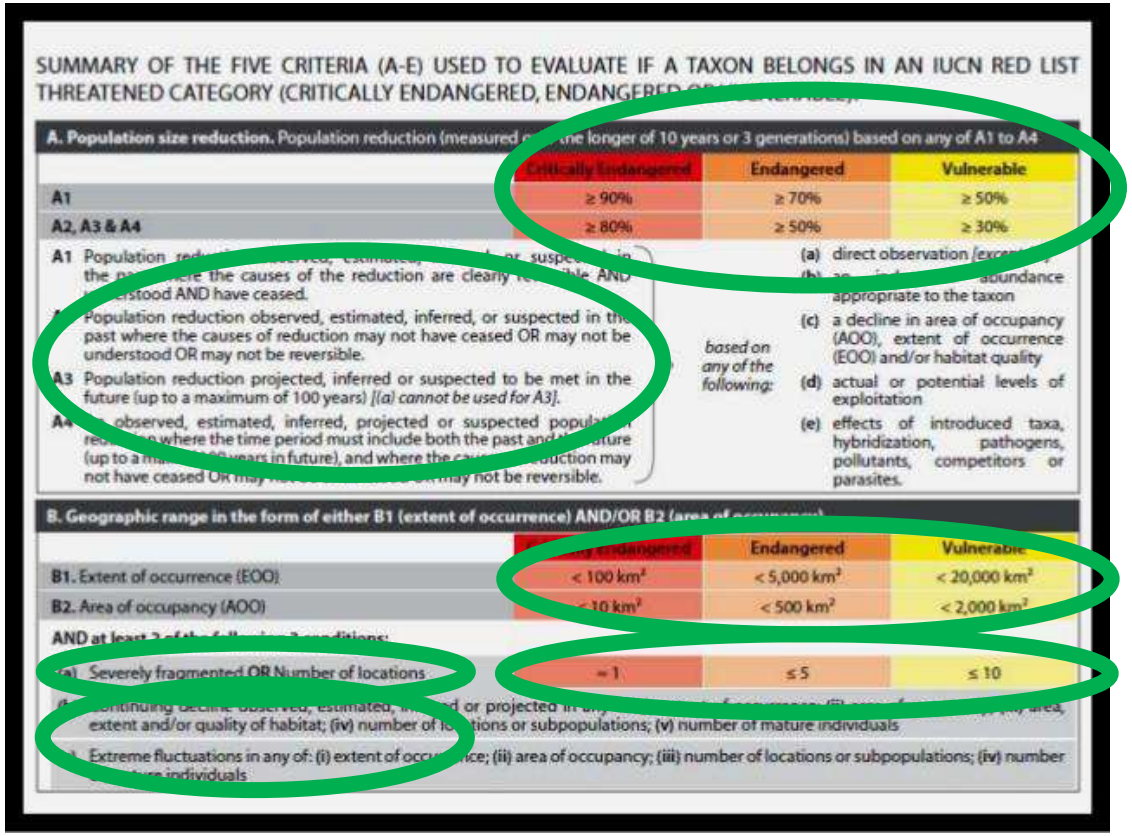
4) Lack of **biological data** (generation length, population fragmentation…)



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A2, A3 & A4	≥ 80%	≥ 50%	≥ 30%

A1 Population

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A3 Population reduction projected, inferred or suspected to be met in the future (up to a maximum of 100 years) *[(a) cannot be used for A3]*.

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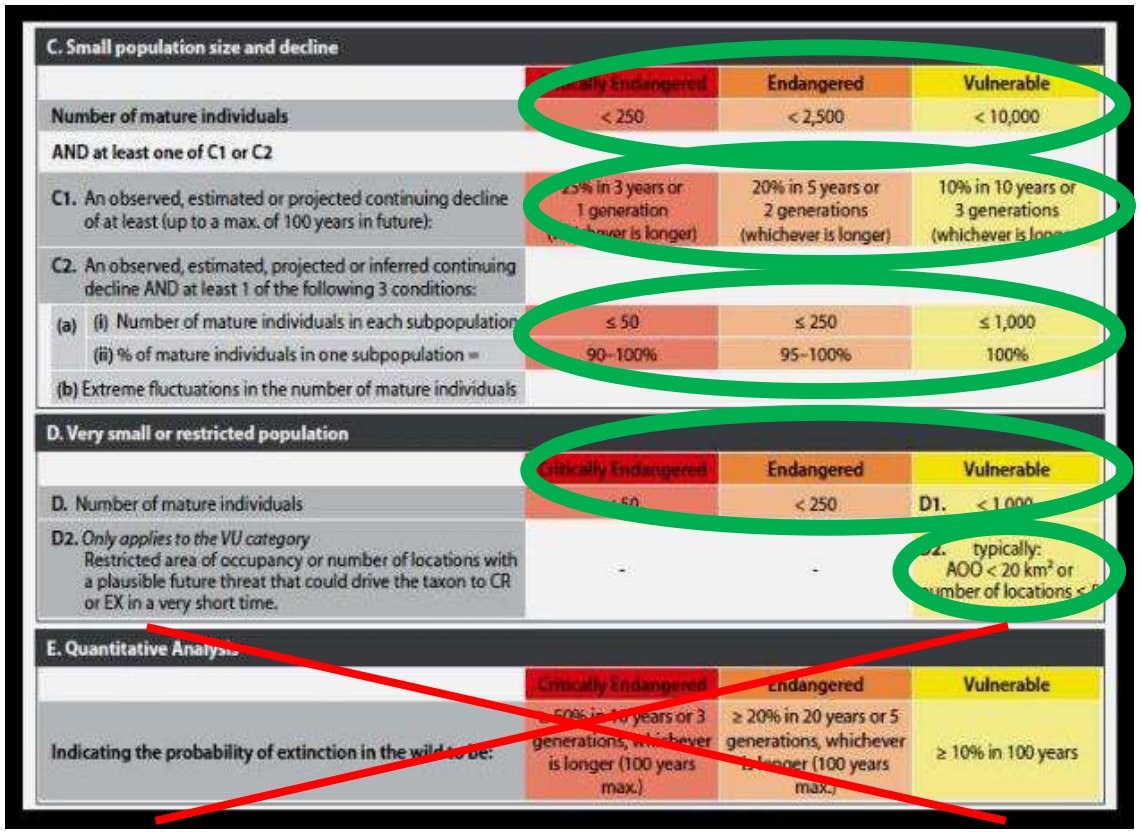
Extreme fluctuations in any of: (i) extent of occ

nce; (ii) area of occupancy; (iii) number of locations or subpopulations; (iv) number

individuals



C. Small population size and decline

	Endangered	Vulnerable
Number of mature individuals	< 2,500	< 10,000
AND at least one of C1 or C2		
C1. An observed, estimated or projected continuing decline of at least (up to a max. of 100 years in future):	20% in 5 years or 2 generations (whichever is longer)	10% in 10 years or 3 generations (whichever is long
C2. An observed, estimated, projected or inferred continuing decline AND at least 1 of the following 3 conditions:		
(a) (i) Number of mature individuals in each subpopulation	≤ 250	≤ 1,000
(ii) % of mature individuals in one subpopulation =	95–100%	100%
(b) Extreme fluctuations in the number of mature individuals		

D. Very small or restricted population

	Endangered	Vulnerable
D. Number of mature individuals	< 250	D1. < 1,000
D2. *Only applies to the VU category* Restricted area of occupancy or number of locations with a plausible future threat that could drive the taxon to CR or EX in a very short time.	-	typically: AOO < 20 km² or number of locations ≤

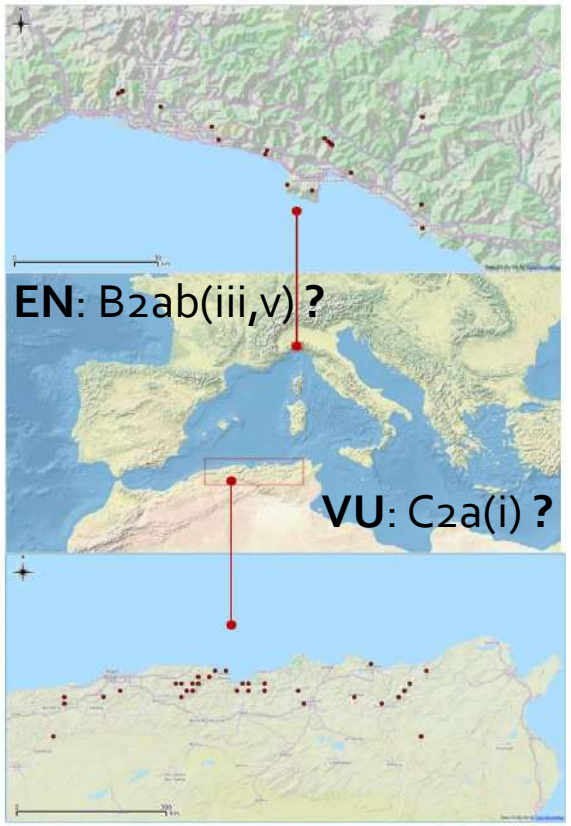
E. Quantitative Analysis

	Endangered	Vulnerable
Indicating the probability of extinction in the wild to be:	≥ 20% in 20 years or 5 generations, whichever is longer (100 years max.)	≥ 10% in 100 years

5. Functional biology and resilience capacities

1) **"Severe" vs normal/neutral/natural fragmentation?**

Orchis patens subsp. *patens*



5. Functional biology and resilience capacities

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2) **Negative "over"grazing vs positive grazing?**

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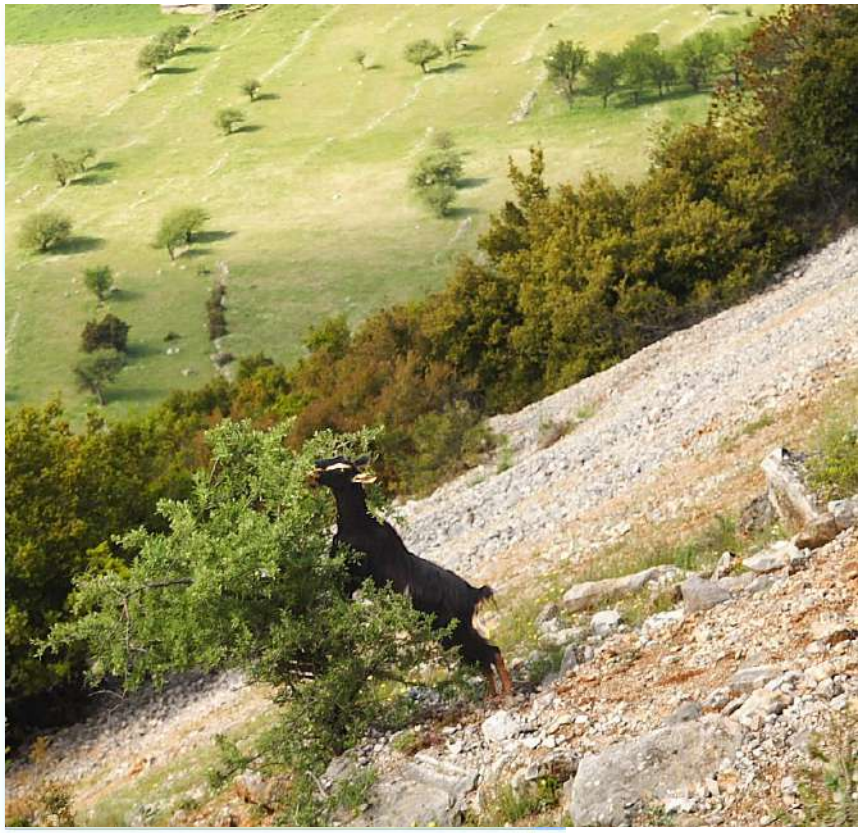

(CC, wikimedia)

5. Functional biology and resilience capacities

1) "Severe" vs normal/neutral/natural fragmentation?
2) Negative "over"grazing vs positive grazing?
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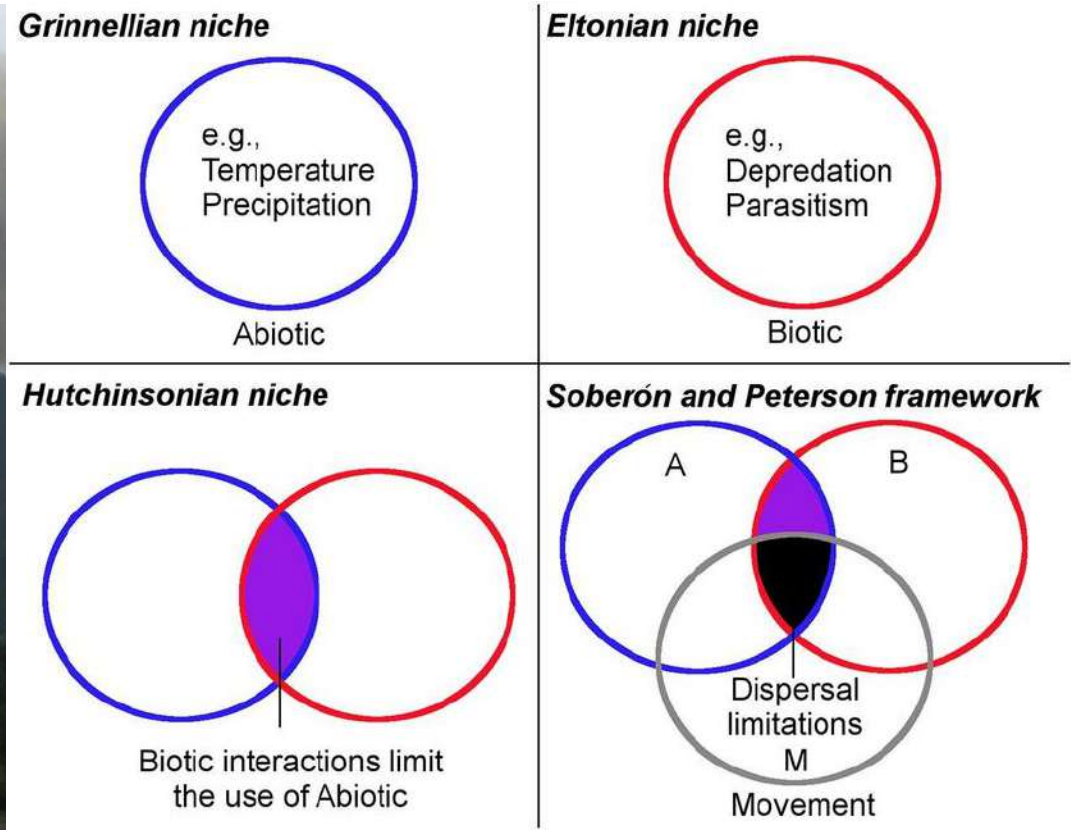
5. Functional biology and resilience capacities

1) "Severe" vs normal/neutral/natural fragmentation?
2) Negative "over"grazing vs positive grazing?
3) forest fires: a dramatic collapse or an endogenous disturbance?
4) **"climatic" vs global change: what do we know about the climatic vs other traits of each species/subspecies? (soil, competition, plasticity, resilience, migration capacities…)**

(Escobar & Craft, 2016)

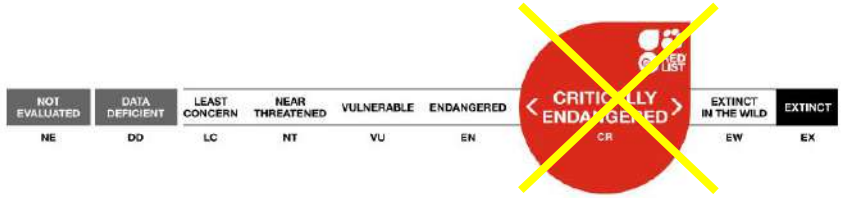

Orchis patens subsp. *patens*



6. Achieving the Mediterranean Red List…

Feedback from reassessing Dicots:

» *Convolvulus durandoi*:



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» 2017 field : not rare, overlooked → **NT** category!

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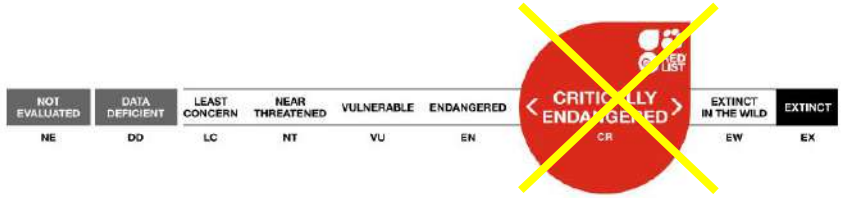

→ Rainy forests on clay soils, not wetlands…

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Should we already reassess Monocots from the 2007-2010 Freshwater plants project?

6. Achieving the Mediterranean Red List…

We first try to **build a strategy for achieving** some objectives in order to complete the Monocots RL before to start a Dicots one in the future…

- Objective 1: complete and publish the draft assessment Monocots already done on SIS (64 taxa);
- Objective 2: transfer and update the data from European assessments of Mediterranean countries (576 taxa) into the global level;
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- Objective 4: try to complete the *Poaceae* family?

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Partial objectives (for RL) but important for conservation:

- Red Listing and action planning for "**evolutionarily distinct species and lineages**" (e.g. monospecific genera)
https://www.iucn.org/commissions/species-survival-commission/get-involved/ssc-edge-internal-grant
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- Encourage students and conservationists to assess their "favorite" species into the SIS (**one by one**)

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Parallel strategy: **national/regional redlistings** through local initiatives (Tunisia, Lebanon, Jordan, Turkey…)

→ How and when to implement the UICN Red List S.I.S. from the national databases, including European ones ?

→ What about orphan territories ? (Morocco, Algeria, Libya, Egypt, Syria…)

Thanks to all experts of the Mediterranean Plant Specialist Group

E. Véla

C. Numa

Montpellier, 2015

D. Allen

V. Barrios

R. Lansdown

Istanbul, 2012

Rabat, 2016