Appendix S1

Synthetic table with all mathematical symbols and equations used in the main text

Variables and indices	**Name**	**Definitions**	**Details**	**References**
Basic variables				
N	Species richness	Number of species in a sample site		
p_i		Relative abundance of species *i* in the sample site	*i* ranges from 1 to *N* with $0 < p_i \leq 1$ and $\sum_{i=1}^{N} p_i = 1$.	
d_{ij}		Functional dissimilarity between species *i* and *j*	For any *i* and *j*, we impose $d_{ij} = d_{ji}$ and $d_{ii} = 0$.	
s_{ij}		Functional similarity between species *i* and *j*	If d_{ij} is in the range $[0,1]$, we have $s_{ij} = 1 - d_{ij}$.	
Indices				
$S = 1 - \sum_{i=1}^{N} p_i^2$	Simpson diversity or Gini-Simpson diversity	*S* is the probability that two individuals drawn at random with replacement from the sampling site belong to different species.		Gini, 1912 Simpson, 1949
$D = \sum_{i=1}^{N} p_i^2$	Simpson dominance	*D* is the probability that two individuals drawn at random with replacement from the sampling site belong to different species.	$D = 1 - S$	Simpson, 1949
$Q = \sum_{i,j=1}^{N} p_i p_j d_{ij}$	Quadratic diversity	*Q* is the mean functional dissimilarity between two individuals drawn at random with replacement from the sample site.		Rao, 1982

$1-Q=\sum_{i,j=1}^{N} p_i p_j s_{ij}$	Functional homogeneity	Mean functional similarity between two individuals drawn at random with replacement from the sample site.		Ricotta et al., 2016
$R=\sum_{i\neq j}^{N} p_i p_j s_{ij}$	Functional redundancy	Mean functional similarity between two randomly selected individuals of different species.	$R=S-Q$ $D+R+Q=1$	Ricotta et al., 2016
$1-R=1-\sum_{i\neq j}^{N} p_i p_j s_{ij}$	Functional uniqueness	A measure of the lack of insurance against the loss of ecosystem processes due to local species extinctions	$1-R=D+Q$	Ricotta et al., 2016 This paper
Species' contributions to indices				
$q_i=\left(\sum_{j=1}^{N} p_j d_{ij}\right)$		Unweighted contribution of species *i* to functional diversity *Q*	$Q=\sum_{i=1}^{N} p_i q_i$	This paper
$r_i=\left(\sum_{j=1,j\neq i}^{N} p_j s_{ij}\right)$		Unweighted contribution of species *i* to functional redundancy *R*	$R=\sum_{i=1}^{N} p_i r_i$ $p_i+r_i+q_i=1$	This paper

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