

THE ECONOMICS OF ECOSYSTEMS AND BIODIVERSITY VALUATION DATABASE - MANUAL

The Economics
& of Ecosystems
& Biodiversity



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The Economics of Ecosystems and Biodiversity (TEEB) is a global initiative focused on drawing attention to the economic benefits of biodiversity. It highlights the cost of biodiversity loss and ecosystem degradation and brings together expertise from ecology, economics and development to support the mainstreaming of biodiversity and ecosystem considerations into decision-making at all levels, including the private sector.

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The Sustainable Ecosystems Team at the Scotland's Rural College is focused on the evaluation of ecosystem goods and services associated particularly with agro-ecosystems, including on the economics of marine ecosystems. Their work is influenced by the ongoing push for agricultural policy reform and by the need to implement national and global action on the ground to address a wide range of environmental concerns.

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The Economics of Ecosystem and Biodiversity

VALUATION DATABASE - MANUAL



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1 Introduction

The purpose of this manual is to summarise and explain the potential uses of the TEEB Valuation Database. The database can be used for a number of purposes - from simple summarising of valuation evidence for particular contexts, to benefit transfer for sophisticated meta-analyses. The manual will discuss the origin of the database; describe its content and structure; outline its contents and discuss how it may be used including important caveats in use.

The TEEB project and similar regional and national initiatives (such as the MA, CICES, UK NEA and MAES)² have increased awareness of the importance of biodiversity and ecosystems in contributing to human well-being and in guiding policymakers, business and individuals in the sustainable use of natural capital. This ecosystem and well-being link as exemplified in the ecosystem services framework has highlighted the importance of integrating ecological and economic analyses into successful environmental policy and management. Part of this has included the recognition of the potential role for the valuation of the benefits provided by ecosystem services – both monetary and non-monetary. For instance, in some cases, qualitative indicators are the only possibility and indeed sufficient to inform decisions, such as, stakeholder values on cultural or spiritual importance of a site. In other cases, monetary terms can prove useful in decision-making. These may include, economic savings from avoided soil erosion, designing Payments for Ecosystem Service (PES) schemes; communicating with Ministries of Finance and Economics (for further information, see the *Guidance Manual for TEEB Country Studies*³, 2013). This document deals with monetary valuations. Over the last few decades, a large number of studies have estimated the monetary value of ecosystem services across a range of ecosystems and countries in response to environmental policy and resource use scenarios. The TEEB Valuation Database we describe here has been developed through iteration from an earlier database developed by de Groot et al (2010) as part of the TEEB study (Kumar, 2010). As we describe below, the current database has been subject to limited review and amendment and also transferred to a spreadsheet format. The database brings together a global sample of valuation studies from a variety of sources including the peer reviewed academic and grey literatures. The database includes 1168 values across 87 countries and 14 biomes.

This manual does not engage in an in-depth discussion of the nature of ecosystem service categorisation and valuation. For example, several authors (see for example UK NEA, 2011: p18)) note that final ecosystem services per se do not always provide goods or services that can be valued – in many instances some further addition or interaction with man-made capital is required to produce a benefit that can be valued. Similarly, we retain the categorisation of ecosystem services used by the original developers of the database (see Background section below). An example where some debate might arise is the treatment of 'biodiversity' as a service; in the database this is categorised as a supporting service ('genepool') although some classifications (e.g. UK NEA) also consider wild species diversity to be an ecosystem service in its own right. Although this distinction seems subtle, it is important when aggregating multiple valuation estimates; where biodiversity is valued solely as a supporting service there is a risk of double counting, i.e. the value of biodiversity is already reflected in the values for other provisioning, regulating and cultural services.

² Millennium Ecosystem Assessment (MA, 2005); Common International Classification of Ecosystem Services (CICES: Haines-Young and Potschin, 2011); UK National Ecosystem Assessment (UK NEA, 2011); Mapping and Assessment of Ecosystems and their Services (MAES: see for example Maes et al, 2012)

³ http://www.teebweb.org/wp-content/uploads/2013/06/TEEB_GuidanceManual_2013_1.0.pdf

2 Background

The database was originally created by de Groot et al (2010) to inform [Appendix 3](#) of *The Economics of Ecosystems and Biodiversity: Ecological and Economic Foundations* (Kumar, ed., 2010). This original database drew on a wide range of sources, specifically through searches of a number of existing valuation databases and through additional references identified by the authors. Summary details of the original database can be found in de Groot et al (2010) and more recently in de Groot et al (2012). The Ecosystem Services Partnership intends to publish a version of the database as the Ecosystem Services Valuation Database (ESVD)⁵.

Since its original development parts of the database have been subject to further review, specifically (Hussain et al 2011) reviewed all studies in the forest (temperate and tropical) and woodland biomes.

This review resulted in some corrections, additions and deletions from the original database; although to our knowledge that review and the amendments have not been reflected in the ESVD.

The version of the database described in this manual has been transferred to an Excel spreadsheet from the original Access database and incorporates the review and changes made by Hussain et al. Although relational databases, such as Access, have many useful features, there are often problems with permissions on some institutional IT systems relating to file authorship; these do not arise with spreadsheets. Further, spreadsheets also lend themselves to data manipulation. An SPSS version of the database has also been prepared. We have made some key transformations of the data which are discussed further in following sections.

3 Database content

The original Access database consists of a main 'Values' table comprised of coded values which are in turn linked to a number of further tables containing the values for those codes and additional variables (see [Appendix A](#) for database structure). This structure has been replicated in the Excel spreadsheet through the use of a number of worksheets. The variables in the main values sheet are described below in [Table 1](#) with the content of the linked worksheets outlined in [Appendix B](#). [Table 1](#) also indicates the variables that are included in the SPSS version.



³ In addition to individual publications, the following ecosystem service databases were used: COPI (ten Brink et al., 2009), EVRI (1997), ENValue (2004), EcoValue (Wilson et al., 2004), Convalmap (Conservation International, 2006), CaseBase (FSD, 2007), ValueBaseSwe (Sundberg and Söderqvist, 2004), ESD-ARIES (UVM, 2008) and FEEM (Ojea et al., 2009). See www.es-partnership.org for access to most of these databases.

⁴ <http://www.fsd.nl/esp> at time of writing (March 2013) the ESVD was unpublished.

⁵ The relationships in the original Access version of the database are illustrated in Appendix A.

Table 1 Description of valuation database variables

VARIABLE	DESCRIPTION	LINKED WORKSHEET	In SPSS version
Index	Unique index value for each study		Y
ValueID	Study ID in original TEEB D0 and ESVD database		Y
LocationID	Location of valuation study site – specific site for valuation study and estimate where available	Location	Y
Latitude	Latitude of study site, country capital city or country centre point in decimal degrees	Location	Y
Longitude	Longitude of study site, country capital city or country centre point in decimal degrees	Location	Y
CountryID	Country ID – indicates country in which valuation study applies	Country	Y
Region	Region in which study applies	Country	Y
Continent	Continent in which study applies	Country	Y
ReferenceID	Study reference ID – indicates source of value estimate	Reference	Y
ReferenceTypeID	Reference type ID – indicates type of publication, e.g. journal, report, book, thesis etc.	Reference Type	Y
ESServiceID	Ecosystem service ID – indicates broad ecosystem service category, e.g. provisioning, regulating, cultural, supporting, various services or aggregated value	ES Service	Y
ESSubServiceID	Ecosystem sub-service ID – indicates specific ecosystem service within each broad category	ES Subservice	Y
ESServiceUse	Comments on particular service		
BiomeID	Biome ID – indicates relevant biome (12 classes)	Biome	Y
EcosystemID	Ecosystem ID – 60 ecosystem classifications with links to relevant biome	Ecosystem	Y
YearofValue	Year of original valuation estimate		Y
YearofStudy	Year of valuation publication (if different from above)		Y
CurrencyID	Currency ID – currency of valuation estimate as published (may not be local currency)	Currency	Y
ServiceArea	Area of site (hectares) to which valuation is applied (if available or relevant)		Y
Biophysical/ ecological Comments	Comments on biophysical or ecological nature of the valuation context		
ValuationMethodID	Valuation method ID – indicates methodology used to estimate value.	Valuation method	Y
OtherMethod	Comments field on valuation method		
ValueTypeID	Value type ID – identifies whether estimated value is a point estimate, a range, a (net) present value (i.e. discounted), annualised value, aggregated TEV, etc.	Value type	Y
Value	Estimated value as reported in study		Y
PointValue	Estimated values including mean values if a range was given		Y
Agg_value	Aggregate value – if value is given on a per hectare basis, i.e. total value of site		Y
ValueRangeLow	Lower bound value if range was stated		Y

Table 1 part2

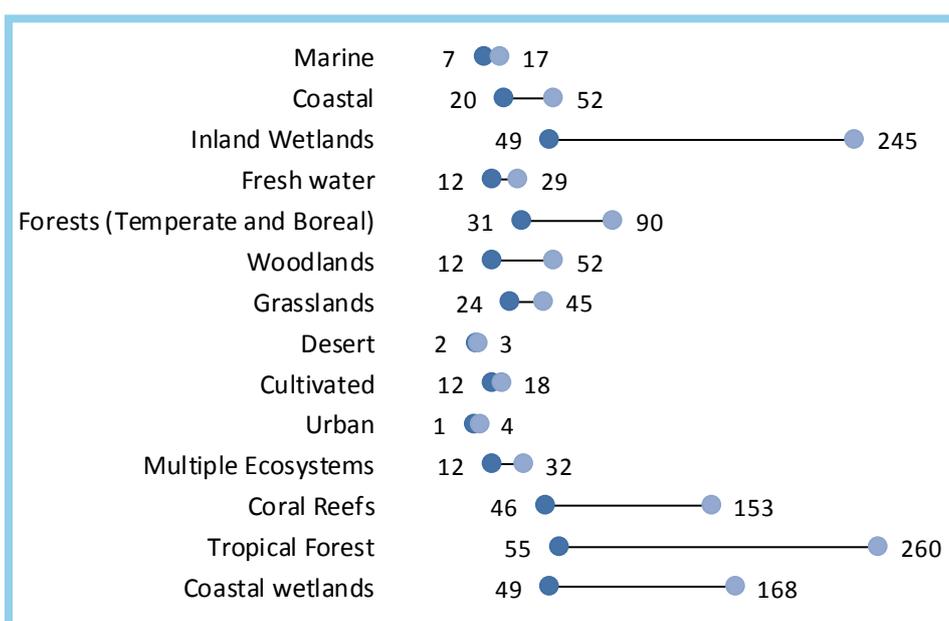
VARIABLE	DESCRIPTION	LINKED WORKSHEET	In SPSS version
Unit	Unit of expressed value		Y
Per_ha_dummy	Dummy = 1 if value is per hectare		Y
Per_hhold_dummy	Dummy = 1 if value is per household		Y
Value_ha	Value per hectare		Y
TEV	Dummy = 1 if value represents TEV		Y
CostIncluded	Dummy = 1 if costs are included in value estimate		Y
CostDescription	Comment on costs		Y
Period	Period over which valuation applies		Y
DiscountRate	Discount rate used (if relevant or stated in study)		Y
BeneficiaryID	Beneficiary ID – identifies who are the beneficiaries of the ecosystem service being valued	Beneficiary	Y
ProviderID	Provider ID – identifies who is providing the ecosystem service	Provider	Y
Unit Price	Price per unit of ecosystem service (e.g. provisioning goods)		
Unit Price Unit	Unit for ecosystem service unit prices		
Unit Price Description	Description of ecosystem unit prices		
ES Indicator Value	Physical value of ecosystem service supply		
ES Indicator Unit	Units of ecosystem service supply		
ES Indicator Description	Description of ecosystem service supply		
Assumptions	Comments added by de Groot et al (2010) on valuation assumptions		
Comments	Comments added on forest and woodland biome only during Hussain et al. (2011) review		
LCU_used	Dummy = 1 if value reported in local currency units (several values reported in US\$ or other common currency)		Y
LCU_value	Value in local currency units in publication year		Y
LCU_agg_value	Aggregate value in local currency units in publication year		Y
LCU/ha value	Value per hectare in local currency units in publication year		Y
LCU GDP deflator	GDP deflator to 2007 values (local currency units)		Y
LCU2007_value	Value in 2007 local currency units		Y
LCU2007_agg_value	Aggregate values in 2007 local currency units		Y
LCU 2007/ha	Value per hectare in 2007 local currency units		Y
2007 PPP	Purchasing power parity exchange rate from local currency units to US\$ (2007 values)		Y
US\$ 2007_value	Value in 2007 US\$		Y
US\$ 2007_agg_value	Aggregate value in 2007 US\$		Y
US\$ 2007/ha	Value per hectare in 2007 US\$		Y

4 Database summary

In this section we summarise the key data in the database. [Figure 1](#) presents the numbers of both studies and value estimates for each biome and indicates that inland wetlands and tropical forests are particularly well represented. There is also a strong presentation of coastal wetlands (e.g. mangroves) and coral reefs. Biomes which have very low representation include marine, deserts, cultivated and urban (each less than 2% of studies). The distribution of studies and value estimates across regions is presented in [Figure 2](#), although there is wide spatial spread of value estimates some areas are better represented than others; the Americas (including the Caribbean), Europe, Eastern and Southern Africa, South and South Eastern Asia, and Australasia are well represented. North Africa, Western Asia and Asia are notable areas with poor representation. The figures illustrate that across both biomes and regions it is common for individual studies to report multiple value estimates; although as [Figure 3](#) illustrates, of the 248 studies in the database⁶, 85 studies provide a single value estimate. The distribution of value estimates by biome type is also mapped in [Figure 4](#).

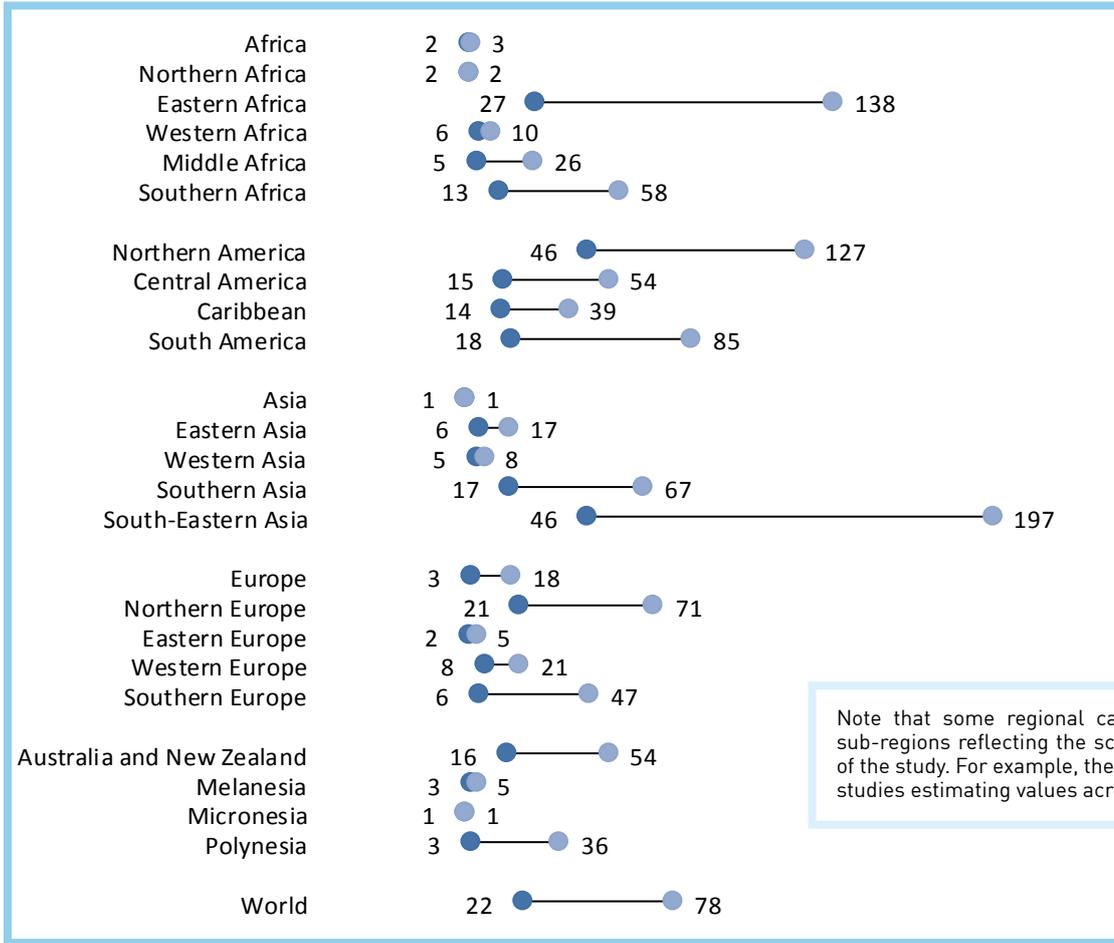
The database contains values for 30 categories of ecosystem services. [Table 1](#) for a lists these together with comparisons to common ecosystem service classifications (MA, TEEB and CICES). As a reflection of its origin the database is most closely linked to the TEEB classification. It also contains a number of amalgamated and 'other' categories. These reflect the valuation literature which often does not conform to a specific ecosystem service classification; may not segregate individual services for practical reasons; or may pre-date the widespread use of the framework. The distribution of the value estimates by broad type of ecosystem service is mapped in [Figure 5](#). Together with [Figure 6](#) this illustrates the relative dominance of provisioning services valuations in developing countries compared to larger proportions of regulating and cultural service valuations in the developed countries.

Figure 1 Number of studies (dark) and value estimates (light) by biome



⁶Note that the number of studies in figures 1 and 2 sum to 332 and 308 respectively, these figures exceed the total of 248 studies as some studies will report values for multiple biomes or regions.

Figure 2 Distribution of studies (dark) and value estimates (light) by region



Note that some regional categories cover multiple sub-regions reflecting the scope or aggregation level of the study. For example, the region 'Europe' refers to studies estimating values across the whole of Europe.

Figure 3 Frequency of valuation estimates per study

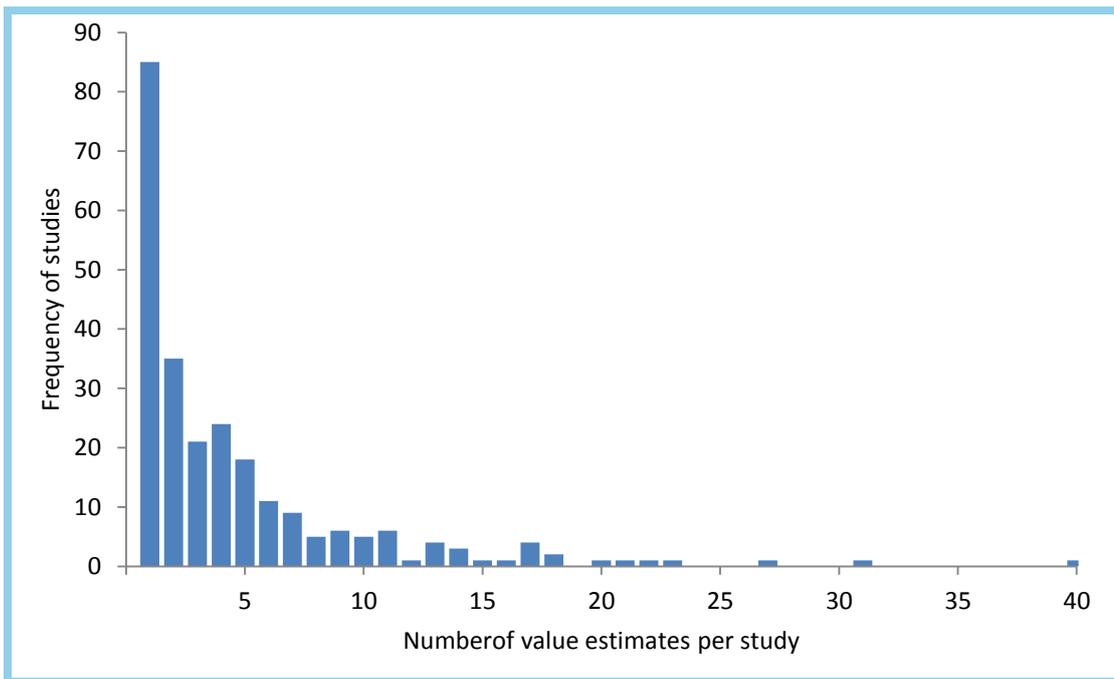
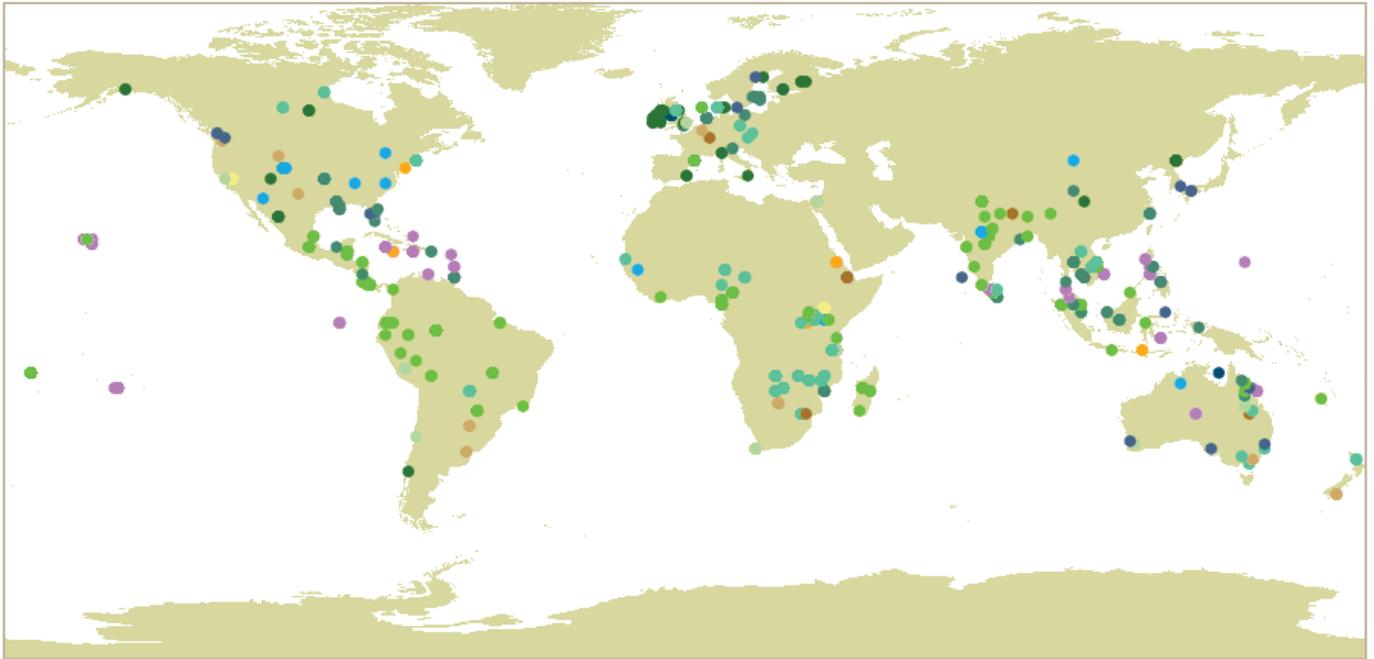


Figure 4 Location and represented biomes of value estimates



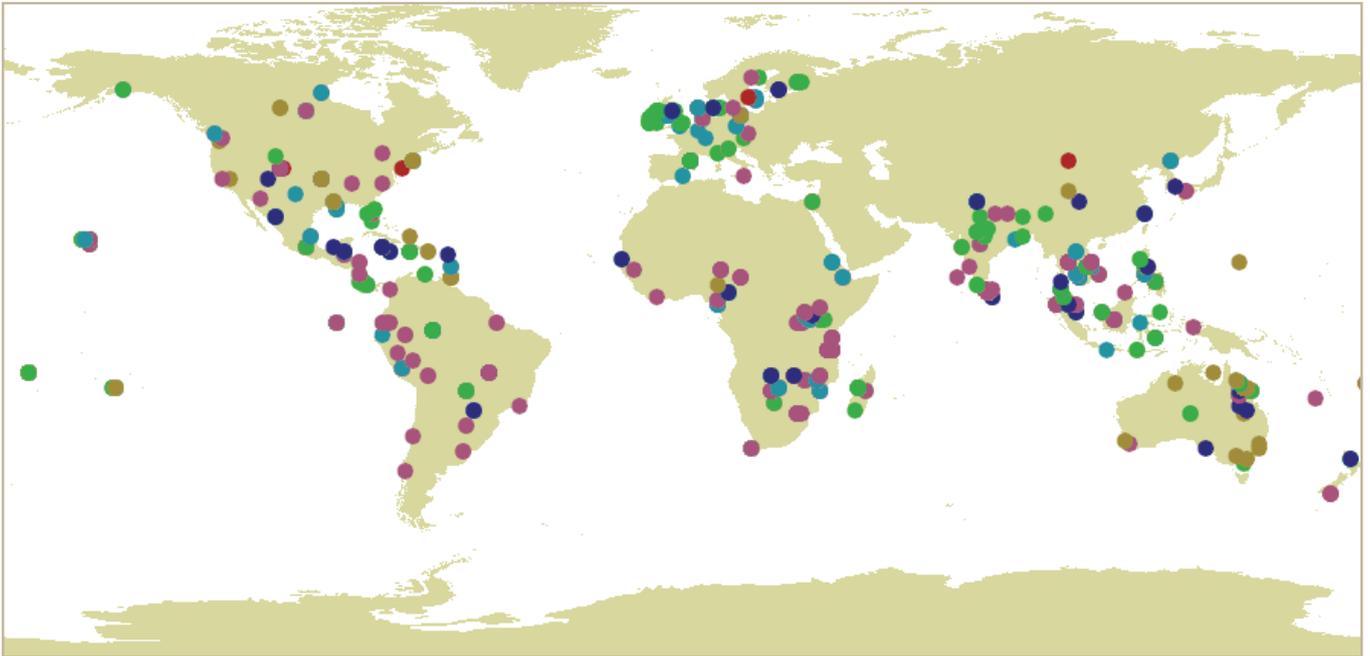
Biomes

- | | | | | |
|----------------------------------|--------------|--------------------|---------------|-----------------------|
| ● Forests (Temperate and Boreal) | ● Grasslands | ● Fresh water | ● Coastal | ● Multiple ecosystems |
| ● Tropical Forest | ● Cultivated | ● Inland wetlands | ● Coral Reefs | ● Urban |
| ● Woodlands | ● Desert | ● Coastal wetlands | ● Marine | |



source: Jemps, Flickr

Figure 5 Location and represented ecosystem service types of value estimates



Ecosystem service types

- Provisioning
- Regulating
- Cultural
- Habitat
- Aggregated
- Various



Table 2 Ecosystem service categories and comparison with common classifications
(adapted from Maes et al 2012)

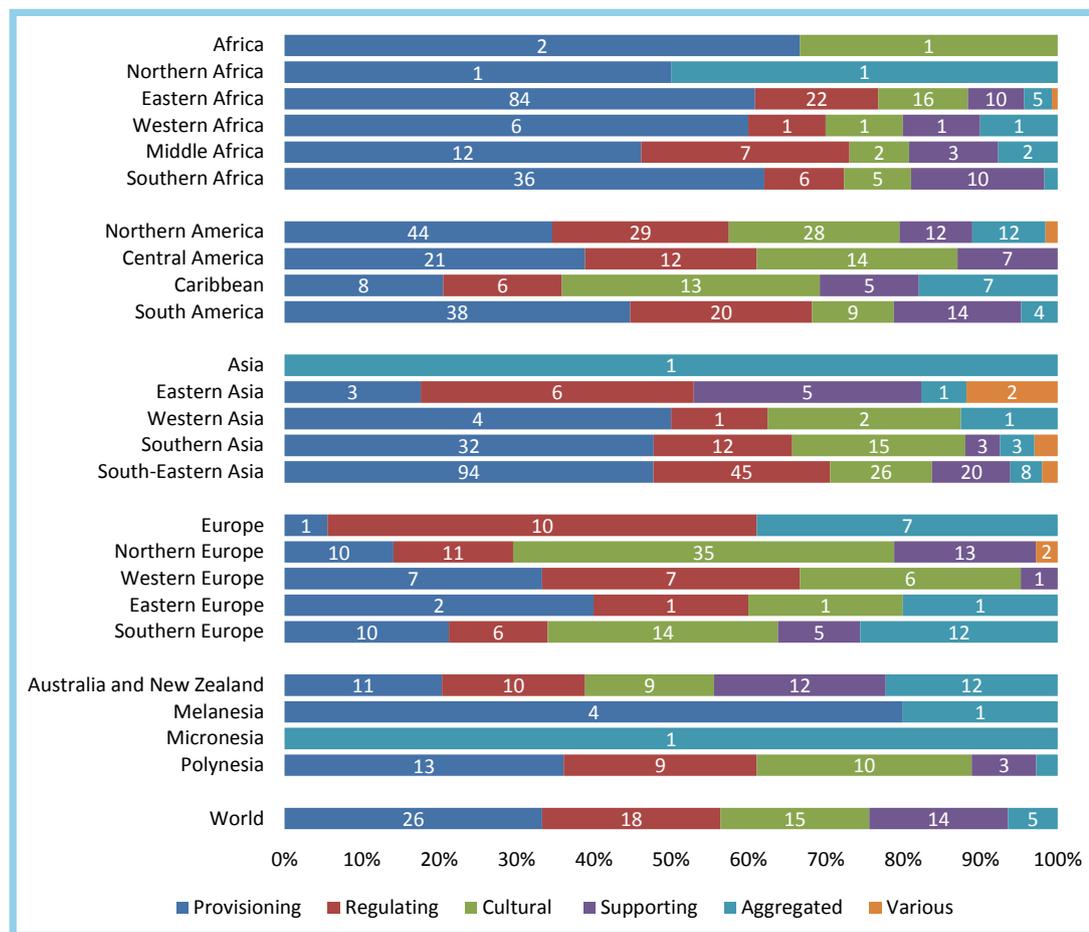
CATEGORY	TEEB DATABASE	MA CATEGORIES	TEEB CATEGORIES	CICES CLASS
PROVISIONING SERVICES	Food provisioning	Food (fodder)	Food	Terrestrial plants and animal foodstuffs Freshwater plants and animal foodstuffs Marine algae and animal foodstuffs
	Water supply	Fresh water	Water	Potable water Non-potable water
	Provisioning of raw material	Fibre, timber	Raw Materials	Biotic materials
	Provisioning of genetic resources Provisioning of medical resources Provisioning of ornamental resources	Genetic resources Biochemicals Ornamental resources	Genetic resources Medicinal resources Ornamental resources	Biotic Materials (Genetic resources) Biotic Materials (Medicinal and cosmetic resources) Biotic Materials (Ornamental resources) Biomass based energy
REGULATING SERVICES (MA AND TEEB)	Air quality regulation	Air quality regulation	Air quality regulation	Atmospheric regulation
	Waste treatment	Water purification and water treatment	Waste treatment (water purification)	Bioremediation Dilution and sequestration Water quality regulation
	Regulation of water flows Moderation of extreme events	Water regulation	Regulation of water flows Moderation of extreme events	Water flow regulation
	Erosion prevention	Erosion regulation	Erosion prevention	Mass flow regulation (erosion protection)
	Climate regulation	Climate regulation	Climate regulation	Atmospheric regulation Air flow regulation
	Maintenance of soil fertility	Soil formation (supporting services)	Maintenance of soil fertility	Pedogenesis and soil quality regulation
	Pollination	Pollination	Pollination	Lifecycle maintenance, habitat and gene pool protection (pollination)
	Biological control	Pest regulation Disease regulation	Biological control	Pest and disease control including alien species
	Lifecycle maintenance (esp. nursery service)	Primary production Nutrient cycling	Maintenance of life cycles of migratory species (incl. nursery service)	Primary production and gene pool protection
Protection of gene pool (conservation)		Maintenance of genetic diversity (especially in gene pool protection)	Lifecycle maintenance, habitat and gene pool protection	

Table 2 part2

CATEGORY	TEEB DATABASE	MA CATEGORIES	TEEB CATEGORIES	CICES CLASS
CULTURAL SERVICES	Spiritual experience	Spiritual and religious values	Spiritual experience	Spiritual
	Aesthetic information	Aesthetic values	Aesthetic information	Aesthetic, Heritage
	Inspiration for culture, art and design	Cultural diversity	Inspiration for culture, art and design	Spiritual Aesthetic, Heritage
	Opportunities for recreation and tourism	Recreation and ecotourism	Recreation and tourism	Recreation and community activities
	Information for cognitive development (education and science)	Knowledge systems and educational values	Information for cognitive development	Information
COMBINED CATEGORIES OR 'OTHER'	Various ecosystem services Other Total Economic Value Provision of Electricity/Energy by natural forces Cultural values combined/unspecified Provisioning values combined/unspecified Regulating values combined/unspecified Habitat values combined/unspecified			

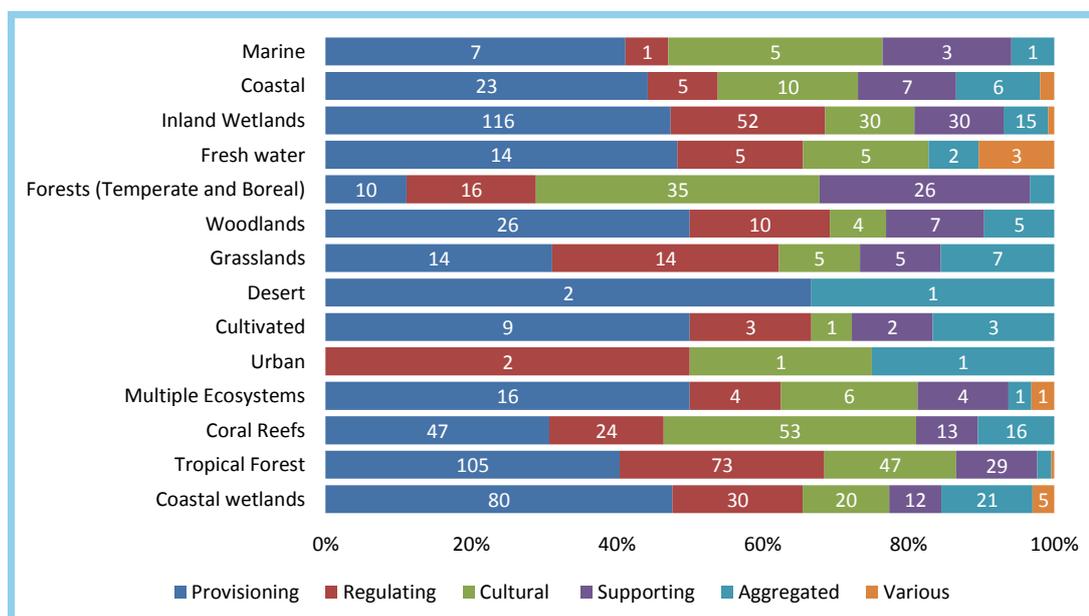


Figure 6 Proportion of value estimates for each ecosystem service category by continent (figures in bars refer to number of estimates)



Note that some regional categories cover multiple sub-regions reflecting the scope or aggregation level of the study. For example, the region 'Africa' refers to studies aggregating values across the whole of Africa

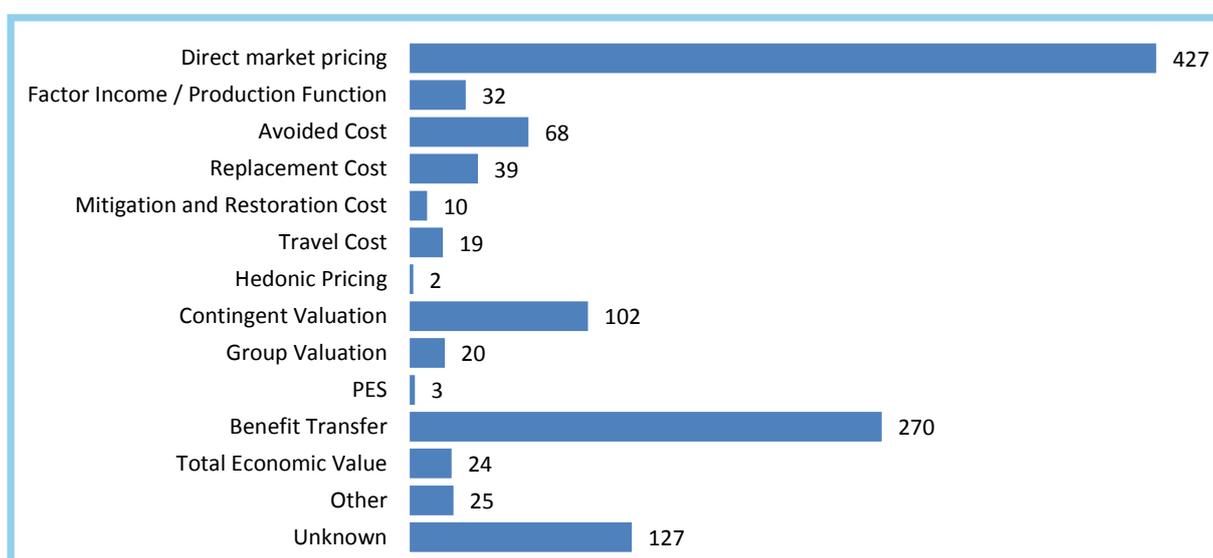
Figure 7 Proportion of value estimates for each ecosystem service category by biome (figures in bars refer to number of estimates)



The different patterns of valuation studies are also apparent in the distribution of different ecosystem service types for each biome (see [Figure 6](#)). A particular contrast can be seen when comparing temperate and tropical forests. Valuations for temperate forests, largely found in developed countries, are dominated by values for cultural services (recreation) and supporting services (biodiversity); tropical forest value estimates cover a broader range of ecosystem services. We speculate that this arises for two reasons:

- i. Interest in valuing ecosystem services in developing country contexts has been motivated by the conservation of natural ecosystems and there is a need to demonstrate the benefits provided by those systems in contrast to destructive or extractive uses such as logging or conversion to agriculture.
- ii. Ecosystems in developed countries have historically seen more intensive human management (particularly for extractive and productive uses) therefore there is far less reliance on remaining natural ecosystems for provisioning services - food and raw materials for which market values are readily observed.

Figure 8 Numbers of value estimates by valuation method



[Figure 8](#) presents the number of value estimates by valuation method. The largest proportion (37%) are from direct market pricing and will relate to provisioning services and some cases visitor spending at recreation sites (as distinct from travel cost estimates). Values derived from benefit transfer make up the next largest proportion (23%) and these estimates should be treated with care depending on the use being made of the database (see discussion below). The valuation method was not identified in 11% of estimates, and again care should be taken when using these studies.

Where possible we have converted all values to a common unit, year and currency viz. 2007 US\$/ha/annum. The data used for the currency conversions and deflations were obtained from the World Bank's World Development Indicators dataset (World Bank, 2010). These calculations involved first estimating the year of study value per ha per annum in local currency units (if reported in another currency such as US\$ these were converted to local units using the appropriate purchasing power parity exchange rate). Per ha values in local currency units were adjusted to 2007 values using appropriate national GDP deflators and then converted to US\$ using the relevant purchasing power parity exchange rate⁷.

⁷The reason for converting a reported US\$ estimate to local currency using the appropriate PPP exchange rate and then back to 2007 US\$ was so as to track changes in the local currency, which is arguably more methodologically defensible for values elicited from local residents. Those studies that elicited values from foreign visitors were not subject to this two-stage conversion.

5 Use of the database

5.1 Summary ecosystem service values

The preceding summary of the database contents illustrates its most straightforward use. The table formatting of the Excel database allows selection and filtering by single or multiple variables to identify studies and values of interest. Suggested categories for such summary analysis include:

- Region;
- Country;
- Ecosystem;
- Biome;
- Ecosystem services;
- Valuation method;
- Combinations of these.

The use of summary analysis is suited to high level reporting and in identifying key data gaps in valuation coverage for key categories.

5.2 Identification of relevant studies for benefit transfer

The spreadsheet database can be interrogated to identify individual studies that can then be used for either unit or value function benefit transfer. In the former case users can filter and select estimates for sites, ecosystems or ecosystem services with characteristics that closely match policy sites to which they wish to transfer values⁸ Similarly, studies can be selected to identify appropriate value functions. The database does not report the parameters of value functions so once studies have been selected users will need to consult the original sources.

UNEP have published guidance on the use of value transfer for ecosystem services (Brander, 2013).

Researchers may also refer to Department of Environment, Food & Rural Affairs' (Defra) practical guidelines for the use of value transfer in policy and project appraisal (2009). These guidelines may help researchers decide on various questions. These include:

- Deciding if value transfer is appropriate for a given appraisal;
- Selecting the most appropriate approach to value transfer and applying an appropriate level of effort;
- Selecting the most suitable economic value evidence;
- Implementing the steps of value transfer; and
- Presenting the results of value transfer to inform decision-making.

⁸ In benefit transfer terminology the 'policy site' is the site to which values are transferred; the 'study site' is the site from which values are transferred.

5.3 Meta-analysis

The range of variables contained in the database should allow users to undertake meta-analyses of values for ecosystems and ecosystem services of interest. This may be of particular use when transferring values to a large number of policy sites. Before proceeding with such analyses we recommend that users undertake the following steps:

- Review the original studies if possible (see caveats below);
- Transform categorical variables into dummy values;
- Ensure values are in common units, e.g. US\$/ha;
- Investigate distributions of quantitative values such as site size and per hectare value – skewed distributions are common and log transformations might be appropriate;
- Identify and enter additional variables as required.

6 Caveats

There are a number of important caveats that users of the database should be aware of before using it and reporting any analysis. The extent to which these are problematic will depend on the intended use of the valuation data.

- The database is a 'snapshot' of available valuation studies from a convenience sample of available sources and the personal knowledge of those originally compiling it. The search for valuation studies did not use pre-defined search terms or data sources so the identification of studies cannot be considered fully systematic. The data sources used are likely to rely on both self reporting and the particular search criteria of those creating earlier data sources. Consequently the database cannot be considered fully comprehensive and it has not been updated with new studies since originally compiled in 2008.
- The studies in the database have been compiled from a variety of sources, each of which may have originally created for different purposes, there is likely to be variation in standard of data entry. We would therefore recommend that users review the original studies if consistent variables are required, particularly for meta-analysis applications. These differing standards of variable entry include the study site coordinates – for some studies these refer to the specific site being valued, for others it is the location of the capital city of the country where the valuation applies. Any analysis using values from the database involving a spatial element or linking to additional spatial data should ensure that the appropriate site coordinates are used.
- Hussain et al (2011) used the forest (temperate and tropical) and woodland biome studies from the original database to undertake a spatial meta-analysis and have reviewed most of the studies for those biomes. Consequently, spatial variables such as site coordinates and area have been reviewed and updated where necessary. However the criteria for inclusion meant that values derived using benefit transfer or without a defined spatial location were rejected from further analysis and were not reviewed. The current database

retains these values as these may be acceptable where only summary values are needed. We recommend that transferred values are not used for further benefit transfer or meta-analysis.

- Users may wish to review the original studies to ensure that the methodological, ecosystem service and site characteristics are consistent with their descriptions of those variables. For example, the valuation method category ‘contingent valuation’ includes a wider range of stated preference methods including discrete choice experiments⁹. Within the range of contingent valuation studies the variety of elicitation methods (open-ended, payment cards/ladders, bidding games, referendum formats) are not identified but these may be important particularly for meta-analysis.
- Users should be aware that 270 of the values in the database were derived from benefits transfer. We would not recommend that these are used for further transfer or meta-analysis to avoid compounding transfer errors. Users should refer to the original studies if possible.
- Users should be aware that many valuation studies were undertaken before the widespread adoption of the ecosystem services framework as a means of classifying environmental goods. Consequently, although entries in the database have been coded to reflect the most relevant ecosystem service, the original definition of the environmental good may not directly translate to the categories used for coding. The valued good may in fact cover multiple ecosystem service categories with little indication of how value may be apportioned across them, this issue may be of relevance for stated preference studies.
- The description of the ecosystem or biome may also be generalised to fit within the pre-defined categories of the database. Users may need to refer to the original studies if very specific ecosystems are of interest.
- Lastly, users should be aware that the values attributed to ecosystem services depend on social, cultural and economic context, and will differ between people and over time. Also, demand-based valuation methods (including both market and non-market values) depend on the size and “ability to pay” of the relevant stakeholder population. Awareness of the size of the original study site is also important as marginal willingness is likely to decline as site area increases. Meta-analysis and benefits transfer approaches need to take this into account for comparing or aggregating values across locations or different scales (Guidance Manual for TEEB Country Studies, 2013).

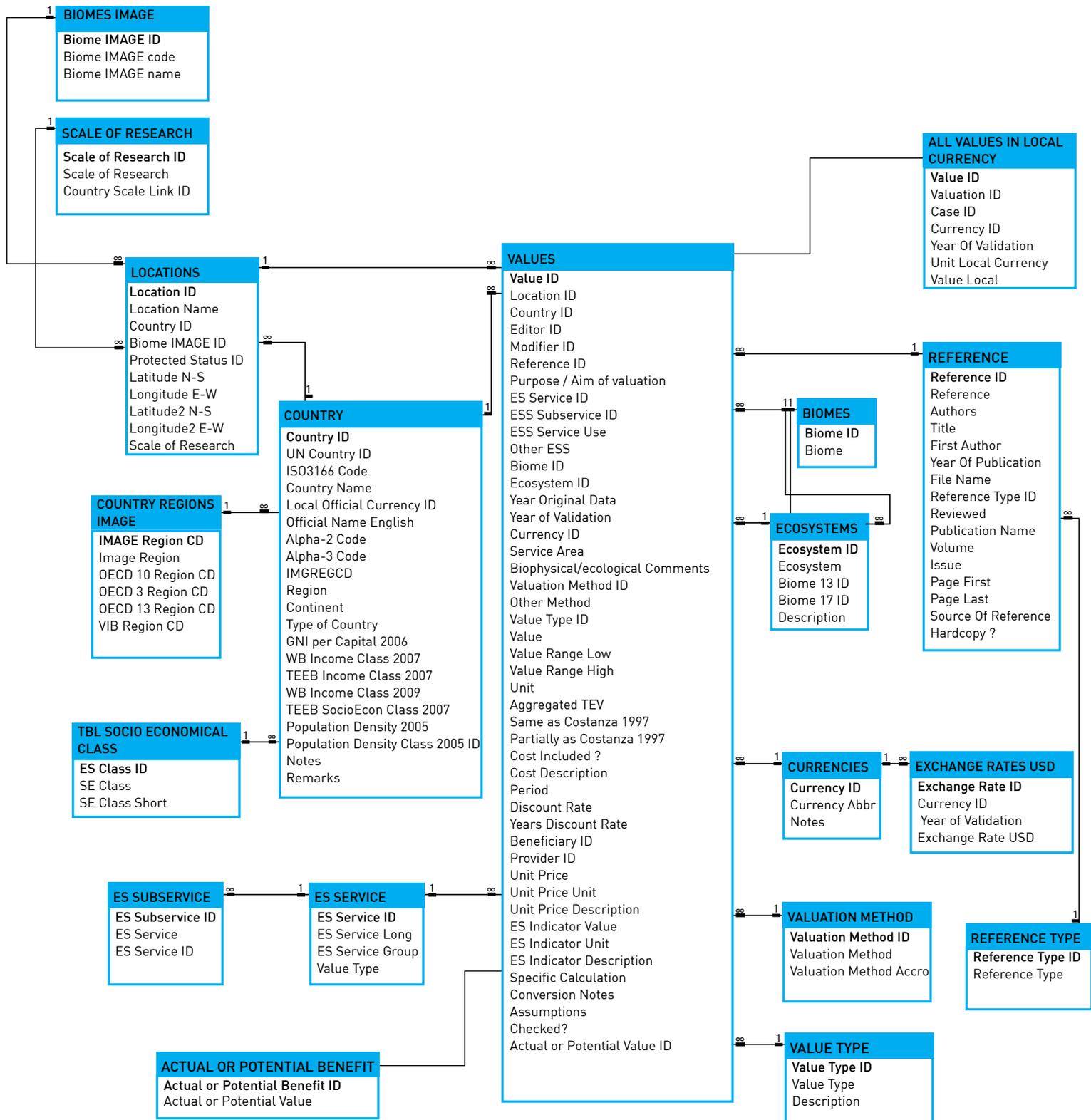


⁹ We were unable to review all studies to refine the definition of valuation method when preparing the database for publication.

7 References

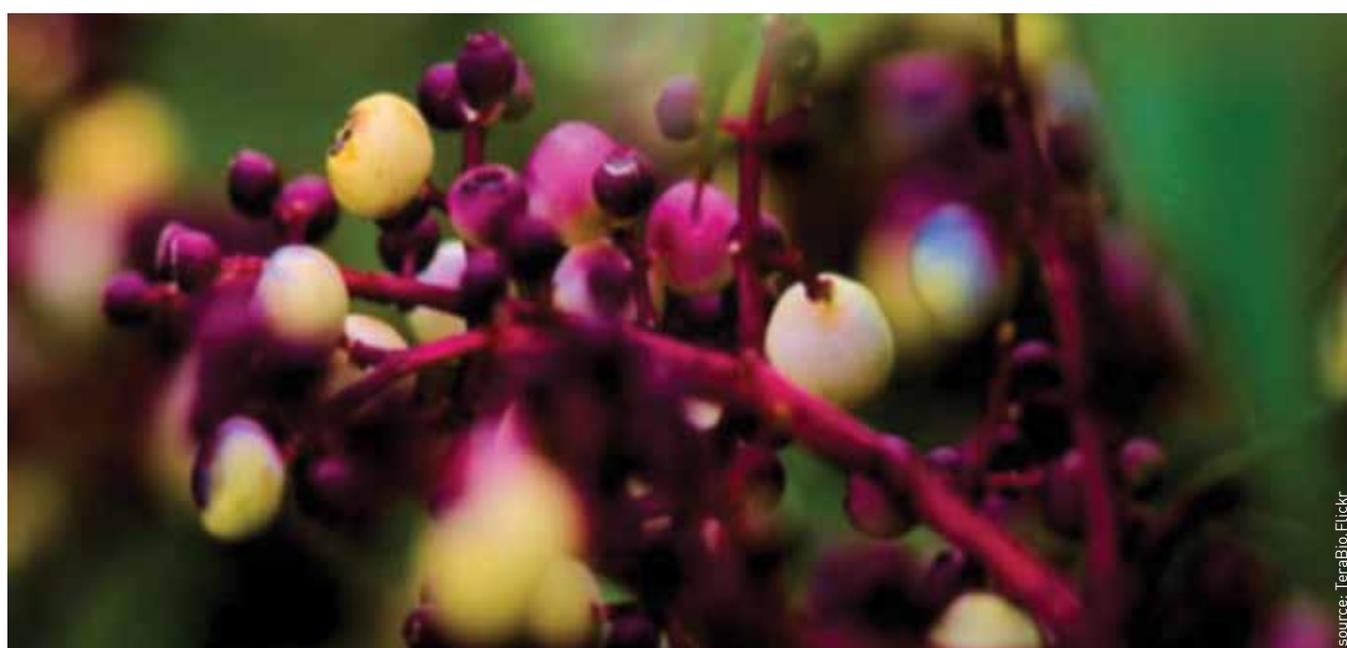
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Appendix A Original Access database relationships



Appendix B Database worksheet description

SHEET NAME	DESCRIPTION
Location	Details of the valuation study site name, its country, type of biome, protected status, coordinate (decimal degrees), and scale of study (from local to global)
Country	Country name, continent and region. Selection of socio-economic classification variable
Reference	Details of the authorship, title, type and source of valuation study including both the original publication and the database it was sourced from
Reference Type	Type of publication the valuation study was contained in, e.g. journal paper, book, report, thesis
ES Service	Classification of ecosystem service type (30 categories) including broad category (provisioning, regulating, cultural, supporting) and value type (direct use, indirect use, non-use)
ES Subservice	More detailed classification of ecosystem services (90 categories) within each ES Service classification
Biome	Classification of relevant study biome (16 categories)
Ecosystem	Classification of ecosystem (60 categories) with links to higher level biome categories
Currency	Name of currency including notes field on changes in official currency (e.g. adoption of the Euro)
Valuation method	Classification of valuation method
Value type	Description of the type of value reported, e.g. total value, value range, net present value, total economic value etc.
Beneficiary	Description of the population that benefited from the ecosystem service being valued
Provider	Description of the provider of the ecosystem service being valued
Miscellaneous	Look up tables referred in the worksheets above but not directly linked to the main database sheet



source: TeraBio, Flickr

Appendix C Cross-tabulations of region and biome

	Marine	Coastal	Inland Wetlands	Fresh Water	Forests (Temperate and Boreal)	Woodlands	Grasslands	Desert	Cultivated	Urban	Multiple Ecosystems	Coral Reefs	Tropical Forest	Coastal Wetlands	TOTAL
Africa			2				1								3
Asia														1	1
Australia and New Zealand	1	4	8	1	1	2	5		2			7	21	2	54
Caribbean					2						1	28		8	39
Central America					11				2			3	31	7	54
Eastern Africa	3	6	60	2	2	6	1	2	3		16	6	17	14	138
Eastern Asia		3	1	1	8									4	17
Eastern Europe			5												5
Europe			3		1	8	2							4	18
Melanesia													1	4	5
Micronesia												1			1
Middle Africa			5						1				20		26
Northern Africa						2									2
Northern America		5	23	14	12	1	11	1			2	16	2	40	127
Northern Europe	8	4	13		33	1						3	1	8	71
Polynesia	2											21	13		36
South America			20		1	9	4					12	39		85
South-Eastern Asia	2	10	25	1			3		1		12	36	58	49	197
Southern Africa	1	2	37	1		8	7		1		1				58
Southern Asia		1	2	4					1			12	31	16	67
Southern Europe		6	6	3	6	11	1		4	4			1	5	47
Western Africa			7	1		1							1		10
Western Asia					2	3	1		2						8
Western Europe		7	8		1		2		1					2	21
World		4	20	1	10		7					8	24	4	78
TOTAL	17	56	245	29	86	52	45	3	18	4	32	153	260	168	1168

Appendix D Cross-tabulation of region and ecosystem services

	Food	Water	Raw Materials	Genetic	Medical	Ornamental	Air quality	Climate	Extreme events	Water flows	Waste	Erosion	Soil fertility	Pollination	BioControl	Nursery	Genepool	Aesthetic	Recreation	Inspiration	Spiritual	Cognitive	VARious	Other	TEV	Energy	Cultural services	Provisioning Services	TOTAL
Africa	1		1																1										3
Asia																										1			1
Australia and New Zealand	4	4	1	1	1		1	1	2	1	3	1	2	1	1	2	6		8						12	1	1		54
Caribbean	6		1	1				1	4			1					5		12			1			7				39
Central America	11		4	3	3			5	3		3	1		1		1	5		14										54
Eastern Africa	33	5	37		7	1		9	1	1	8	3	2			3	5		16				1		5		1	138	
Eastern Asia	1	1					1	2	1	1		1	1		1		3						2		1		1	17	
Eastern Europe	1										1								1						1		1	5	
Europe			1				2	1			6	1													7			18	
Melanesia	2		1		1																				1			5	
Micronesia																									1			1	
Middle Africa	6	1	4	1				2	3		1	1	1				2		2						2			26	
Northern Africa			1																						1			2	
Northern America	16	11	3	1	1	3		10	8	1	5	1	1		1		10	3	23			1	2		12	4	1	9	127
Northern Europe	7		3					2	5		4		2				11		33	1			2				1	71	
Polynesia	4	1	6	2				2	4	1	1	1			1		2	1	5	2		2			1			36	
South America	14	3	11	1	6	2		6	4	1	2	6	2	2	1	2	7		5	2	1	1			4	1		85	
South-Eastern Asia	47	6	30	1	6			13	15	3	2	9		1		5	14		25			1	3	1	8	3		4	197
Southern Africa	20	2	11		2	1		2	1		2	1		1			9		5						1			58	
Southern Asia	14	3	11		4			3	5	1	2	1	1				2		15				2		3			67	
Southern Europe	1	4	5					2	2	1	1			2			3		11						12		3	47	
Western Africa	3		2		1					1							1	1							1			10	
Western Asia	2		2					1										1	1						1			8	
Western Europe	3		4					1		5	1					1			4		1	1						21	
World	10	3	9	2	2			9	3		6		2	1	4	1	6	1	13	1					5			78	
TOTAL	206	44	148	13	34	7	4	70	63	12	52	29	14	9	9	15	91	7	194	6	2	7	12	1	87	9	6	17	1168

