



13th Meeting of the Conference of the Contracting Parties to the Ramsar Convention on Wetlands

**“Wetlands for a Sustainable Urban Future”
Dubai, United Arab Emirates, 21-29 October 2018**

Ramsar COP13 Inf.9

Amended version of Doc.18.18 Rev.2 (29 October) Rapidly assessing wetland ecosystem services

Submitted by the Republic of Korea

1. RECOGNIZING that, to achieve the Mission of the Ramsar Convention as described in the Strategic Plan 2016-2024, it is essential that vital ecosystem functions and the ecosystem services that wetlands provide to people and nature are fully recognized, maintained, restored and wisely used and the need to develop approaches for assessing both ecosystem functions and ecosystem services;
2. RECALLING that Annex A to Resolution IX. 1, on *Additional scientific and technical guidance for implementing the Ramsar wise use concept*, defines the ecological character of wetlands as the combination of the ecosystem components, processes and benefits/services that characterize the wetland at a given point in time; ALSO RECALLING the guidance for valuing the benefits derived from wetland ecosystem services (Ramsar Technical Report No.3 and CBD Technical Series No.27) provided guidance for valuing wetland advice on when and why wetland valuation should be undertaken and set out framework for the integrated assessment and valuation of wetland services;
2. NOTING that a priority area of focus for the Convention under the Ramsar Strategic Plan 2016-2024 is to enhance the information about ecosystem functions and the ecosystem services that wetlands provide to people and nature; ALSO RECALLING Target 11 of the Ramsar Strategic Plan 2016-2024 (Resolution XII.2), “Wetland functions, services and benefits are widely demonstrated, document and disseminated”, and that the assessment of ecosystem services of Ramsar Sites is a key indicator to estimate this target;
4. FURTHER recognizing that under Resolution XII. 3, on *Enhancing the languages of the Convention and its visibility and stature, and increasing synergies with other multilateral environmental agreements and other international institutions*, Parties and other stakeholders are encouraged to increase their efforts to communicate on the values of ecosystem services of wetlands in other sectors’ strategies, plans and regulations, and integrate them into a basin approach to land-use plans and other relevant local, national and global decisions;
5. FURTHER NOTING the requirement under Resolution XI.8, on *Streamlining procedures for describing Ramsar Sites at the time of designation and subsequent updates*, to ensure that a comprehensive description of ecosystem services is provided in the Ramsar Information Sheet (RIS) of a Wetland of International Importance (Ramsar Site), and that if there are other

ecosystem services occurring on the Site which do not fit against this classification, that they should also be described in the RIS;

6. ACKNOWLEDGING that the important ecosystem functions and ecosystem services, as highlighted in the Strategic Plan 2016-2024, that wetlands provide have direct relevance to the achievement of the Sustainable Development Goals related to poverty eradication, food and nutrition, healthy living, gender equality, water quality and supply, water security, energy supply, reduction of natural disasters, innovation and the development of appropriate infrastructure, sustainable human settlements, adaptation to climate change, oceans, seas and marine resources, biodiversity and sustainable use of ecosystems;
7. RECOGNIZING the importance of indicating the presence or absence of all relevant ecosystem services/benefits currently provided by each Ramsar Site when completing or updating the RIS and the need to also recognize important ecosystem functions;
8. FURTHER recognizing the priority thematic work area of the Scientific and Technical Review Panel (STRP) for 2016-2018 that requested the development of methodologies for the economic and non-economic valuation of the goods and services of wetlands, and the importance of integrating multiple wetland values into decision-making, as described in Ramsar Policy Brief 2;
9. CONSIDERING that only 19% of Contracting Parties reported to COP12 in their National Reports that they had assessed the ecosystem benefits/services provided by Ramsar Sites;
10. ALSO CONSIDERING that, without the application of appropriate methodologies, the multiple functions and values of wetlands may continue to be poorly recognized and integrated into decision-making; and
11. THANKING the Government of the Republic of Korea, Suncheon City (Republic of Korea), the International Union for Conservation of Nature (IUCN) and the Ramsar Regional Center – East Asia (RRC-EA) for their generous sponsorship and organization of workshops that laid the foundation for the present Resolution;

THE CONFERENCE OF THE CONTRACTING PARTIES

- 11bis. ENCOURAGES Contracting Parties to recognize the need to assess both wetland ecosystem functions and ecosystem services:
12. TAKES NOTE of the rapid assessment of wetland ecosystem services approach annexed to the present Resolution; and RECOGNIZES that it could be applied, as appropriate, by Contracting Parties to assist their delivery on the targets of the Strategic Plan 2016-2024;
13. INVITES Contracting Parties to volunteer to further develop this methodology in light of scientific and technical advances based on assessments of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) and the results of the work on The Economics of Ecosystems and Biodiversity (TEEB), Mapping and Assessment of Ecosystem Services (MAES) or other approaches as appropriate;
14. ACKNOWLEDGES the *Rapid assessment of wetland ecosystem services* annexed to the present Resolution as an example of a voluntary assessment approach for evaluating the ecosystem services of Wetlands of International Importance (Ramsar Sites) and other wetlands that may

be useful to Contracting Parties; and ENCOURAGES Contracting Parties that are yet to adopt effective approaches for the recognition and evaluation of ecosystem services provided by their Ramsar Sites and other wetlands to consider using the *Rapid assessment of wetland ecosystem services* approach; and CONFIRMS that the present Resolution does not create additional reporting obligations for Contracting Parties;

15. ENCOURAGES Ramsar Site management authorities to apply, as appropriate, approaches such as the *Rapid assessment of wetland ecosystem services* as a tool in order to assess the ecosystem services that their Site provides, to contribute to the description of the ecological character of their Site and to ensure the maintenance of these services in their management processes; and ENCOURAGES Parties to use the data and information gathered to update the relevant sections of the Ramsar Information Sheet for the Site;
16. RECOGNIZES the long-term value of taking a participatory approach, involving indigenous peoples and local communities, subject to the respective national laws of the Contracting Parties when recognizing and understanding the ecosystem functions and ecosystem services provided by wetlands;
17. INVITES Contracting Parties to support the translation and further development of the *Rapid assessment of wetland ecosystem services* annexed to the present Resolution into languages that are not official languages of the Ramsar Convention within a broad approach of the context of the Strategic Plan;
18. ENCOURAGES Contracting Parties to promote the use of Ramsar communication tools including websites and social media by Ramsar Site management authorities to highlight more widely the ecosystem functions and ecosystem services provided by wetlands;
19. ENCOURAGES those who modify and use approaches such as the *Rapid assessment of wetland ecosystem services* under the broad context of the Strategic Plan to also refer to other relevant Ramsar guidelines, when making these assessments;
20. ALSO ENCOURAGES Contracting Parties, as appropriate, to utilize this approach and other relevant approaches for the rapid assessment of wetland ecosystem services when preparing their National Reports and describing the status of Sites on the List; and
21. REQUESTS the STRP and the secretariat to work with contracting parties to review and compile outputs from this voluntary assessment approach, subject to the availability of resources, and share information with other relevant bodies on behalf of the Ramsar Convention; also REQUESTS the STRP working with IOPs and other observer organizations to review outputs from the *Rapid assessment of wetland ecosystem service* (RAWES), subject to the availability of resources, to ensure that it evaluates effectively the ecosystem services of wetlands.

Annex 1

Rapid assessment of wetland ecosystem services

Introduction

1. To achieve wise use, and for wetlands to contribute fully to sustainable development, policy-makers and practitioners (such as site managers) need to recognize the important functions and the multiple values¹ of wetlands, and reflect them in their decisions, policies and actions². Without wetlands, the water cycle, carbon cycle and nutrient cycle would be significantly altered, mostly detrimentally. Yet, often due to a failure to recognize these multiple, interconnected values, policies and decisions do not sufficiently take into account these interconnections and interdependencies³.
2. The Ramsar Convention has recognized the need to integrate the important functions and multiple values of wetlands into decision making and has produced policy briefs¹, technical reports⁴ and wider guidance to address the importance of this issue. However, a review published in 2016 concluded that there is an urgent need to ensure that the requirement to assess a broad range of ecosystem services is achieved in accordance with the reporting obligations under the Ramsar Convention⁵. This improved awareness of and reporting on a comprehensive range of ecosystem functions and ecosystem services is required for both Ramsar Sites and other wetlands.
3. However, there are inherent limitations, including resourcing, access, cooperation and capacity, which have acted as barriers to more extensive attempts to recognize the functions and multiple benefits that wetlands provide. Therefore, the development of procedures for assessing wetland ecosystem functions and ecosystem services should be targeted and pragmatic in their approach and involve participation of local communities and indigenous knowledge, as appropriate.
4. Many wetland managers have limited time and resources. Therefore, the development of approaches to assessing wetland ecosystem services needs to satisfy the definition of “rapid” insofar that no more than two people should spend more than half a day in the field and another half day of preparation and analysis⁶.

¹ The integral values and benefits, both material or non-material for people and nature, in a non-consumptive approach include spiritual, existential and future-oriented values. Ramsar 4th Strategic Plan 2016-2024.

² Kumar, R., McInnes, R.J., Everard, M., Gardner, R.C., Kulindwa, K.A.A., Wittmer, H. and Infante Mata, D. (2017). *Integrating multiple wetland values into decision-making*. Ramsar Policy Brief No. 2. Gland, Switzerland: Ramsar Convention Secretariat.

³ Russi D., ten Brink P., Farmer A., Badura T., Coates D., Förster J., Kumar R. and Davidson N. (2013). *The Economics of Ecosystems and Biodiversity for Water and Wetlands*. IEEP, London and Brussels; Ramsar Secretariat, Gland.

⁴ De Groot, R.S., Stuij, M.A.M., Finlayson, C.M. and Davidson, N. (2006). *Valuing wetlands: guidance for valuing the benefits derived from wetland ecosystem services*, Ramsar Technical Report No. 3/CBD Technical Series No. 27. Ramsar Convention Secretariat, Gland, Switzerland & Secretariat of the Convention on Biological Diversity, Montreal, Canada. ISBN 2-940073-31-7.

⁵ McInnes, R.J., Simpson, M., Lopez, B., Hawkins, R. and Shore, R. (2016). Wetland ecosystem services and the Ramsar Convention: An assessment of needs. *Wetlands*. 37(1), 1-12.

⁶ Fennessy, M.S., Jacobs, A.D. and Kentula, M.E. (2007). An evaluation of rapid methods for assessing the ecological condition of wetlands. *Wetlands* 27 (3), 543–560.

Rapid assessment of wetland ecosystem services

5. The development of the *Rapid assessment of wetland ecosystem services* (RAWES) approach, as an example of approaches that can be developed, has considered the requirements of the Ramsar Convention, and particularly the need for qualitative assessments that are not resource intensive and that can be applied within the context of Ramsar Convention-related reporting. However, consideration has also been given to developing an approach that would have wider utility as part of a broader suite of assessment approaches. Consequently, the objective of the RAWES approach is to facilitate an assessment of the plurality of benefits provided by a wetland which can be considered genuinely rapid, involving limited resources.
6. Based on an understanding of what is required by a specific, but global, wetland audience, the approach has, at its core, the realization that in many situations the availability of time, money and detailed information will be limited and such barriers need to be overcome if the full range of functions and values is to be recognized. Furthermore, the development of the RAWES approach recognizes that less time-intensive methods can be applied at a range of scales, from the site to the landscape or catchment. Too often, assessments of ecosystem services are limited in their scope and fail to identify the multiplicity of benefits provided by wetlands, focusing on a few easy-to-recognize benefits, and consequently inherently assigning a default value of zero to these services and thereby excluding them from decision-making fora⁷.
7. The RAWES approach builds on similar techniques applied elsewhere⁸. A checklist of services grouped into functional categories, which were originally defined in the Millennium Ecosystem Assessment, namely provisioning, regulating, cultural and supporting services, acts as an initial structured framework. Although in more recent analytical frameworks the category of supporting services is no longer included, it is retained in RAWES as it recognizes the functioning and resilience of productive ecosystems rather than valuation. Supporting services therefore constitute important considerations in terms of the resilience and capacity of ecosystems to provide wider benefits, and are therefore important considerations in management decision-making.
8. The list of ecosystem services in RAWES can be modified and adapted, as appropriate, of each Contracting Party and to the local context through dialogue and consultation with local stakeholders who are familiar with the wetland. Furthermore, when an assessment is being made to inform or update the Ramsar Site Information Sheet (RIS) it is important to ensure that the description of the ecosystem services provides information on the services described under Resolution XI.8 as well as on any other services that the site is providing. Delimitation of the exact area to be assessed is defined objectively by the assessor depending on the purpose or scope of the assessment. The RAWES approach is flexible, allowing assessments to be made on different habitat units within a larger wetland complex or on an entire wetland site. The onus is on the assessor to define the “wetland” and record the rationale behind the boundaries set and limits used. Since wetland ecosystems can be dynamic or can be subject to change or degradation, an important issue to be addressed is the definition of the condition at the time of

⁷ McInnes, R.J. and Everard, M. (2017). Rapid Assessment of Wetland Ecosystem Services (RAWES): An example from Colombo, Sri Lanka. *Ecosystem Services*. 25, 89-105. <http://dx.doi.org/10.1016/j.ecoser.2017.03.024>.

⁸ Defra. (2007). An introductory guide to valuing ecosystem services [online]. Department for Environment Food and Rural Affairs (Defra), pp. 68. Available from: www.defra.gov.uk.

the assessment. In some cases, the “natural” condition will vary over time, and it will be necessary to ensure this temporal pattern is considered in the assessment of ecosystem services. For instance, the assessment could return different outcomes if it is conducted during a drought or when the area is subjected to flooding, both of which may represent natural phenomena within the broader tolerances of the system. In other circumstances, a wetland may be subject to on-going degradation, such as through pollution of surface water or infilling. Therefore, it cannot be safely assumed that the current situation reflects a “natural” condition, and that service delivery is not already influenced by the prevailing conditions. The key issues are to ensure that a comprehensive range of ecosystem services is assessed, that the evidence used to achieve the assessment outcome is transparent and clear, and that the prevailing temporal context is recorded.

Applying the RAWES approach

9. RAWES is designed as a simple and rapid site assessment system that may obtain input from existing studies but does not rely on detailed, quantitative assessments. As such, it is a genuinely rapid approach that may typically take less than two hours per site with trained assessors working in pairs for cross-referencing. Significantly, the RAWES approach is also systemic, addressing all ecosystem services as a connected set rather than selecting only the most readily evaluated or exploited services, and thereby overlooking other services. The RAWES Field Assessment Sheet is included in Appendix 1, with an accompanying explanatory table to guide assessor thinking included at Appendix 2. This sheet presents a list of ecosystem services which may be interpreted depending on the application. For instance, to inform or update the RIS it is important to ensure that the description of the ecosystem services provides information on the services described under Resolution XI.8 as well as on any other services that the site is providing. The method has been used widely in Asia, Australia, Europe and Africa, with a database of sites and informing a number of scientific publications and site reports about the range and likely importance of ecosystem services provided by wetland sites.
10. RAWES can be used across a range of scales from whole-wetland to localized zones of large and complex wetlands; it is also in principle also relevant to other habitat types. The RAWES assessment form is a simple table with cells into which assessors record the importance of each ecosystem service produced at the wetland site, with space for free text descriptions of key features supporting that assessment. Assessors are encouraged to interact with stakeholders so that assessments are informed by local perspectives and indigenous knowledge, ensuring that all services are recognized. Early interaction is recommended in order to refine the list of services to be assessed and subsequently to assess the significance of each service.
11. The RAWES Field Assessment Sheet (Appendix 1) comprises the following sections:
 - Wetland name with GPS coordinates
 - Assessment date
 - Assessor name(s)
 - Table cells to record: (1) the importance of the service assessed using the following relative scale (adapted from Defra 2007, see Table 1 below) where, in order to improve objectivity, the level of significance is decided prior to conducting the assessment but is based on a pre-determined number or range of beneficiaries (or dis-beneficiaries); (2) free text box to describe the benefit; and (3) record of benefit realized at local, regional or global scales, the definition of which needs to be decided prior to conducting an assessment.

Table 1. Defra (2007) scale of likely significance of ecosystem services

Score	Assessment of ecosystem service
++	Significant positive contribution
+	Positive contribution
0	Negligible contribution
-	Negative contribution
--	Significant negative contribution
?	Gaps in evidence

12. The assessment sheet provides an initial list of ecosystem services under the four main categories of provisioning, regulating, cultural and supporting services. This initial list should act as a starting point for considering the multiple benefits provided by a wetland. Assessors are encouraged to consider whether this list needs to be expanded or made more site- or context-specific in order to address specific services. For instance, “food” is provided as a catch-all term but could be sub-divided into more detail such as “harvested crops”, “fish and shellfish” or “collection of fruit and berries” if significant differences are experienced in the wetland being assessed.

Table 2. Linking services to beneficiaries at different scales.

<ul style="list-style-type: none"> • Local benefits: Those experienced by individuals, households or communities living and working in the immediate vicinity of the wetland. • Regional benefits: Those delivered to individuals, households or communities living and working in the wider catchment of the wetland. • Global benefits: Those that extend beyond national boundaries.
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13. Scores are thus allocated semi-quantitatively, using assessor knowledge and other local and technical input. A more quantitative approach would be more resource-intensive, far from rapid, and would risk overlooking services not initially considered but potentially locally important, as well as skewing assessment towards the more readily exploited, marketable and therefore quantified services to the detriment to other important maintaining processes and wider benefits. The RAWES rapid method thus serves an operational need to incorporate ecosystem service assessment routinely into Ramsar Site assessments and plans.
14. Training in rapid assessment methods has been highlighted as being essential if subjectivity is to be reduced and repeatability of results is to be enhanced⁹. Typically, a one-day training course mixing classroom and field sessions on the RAWES method suffices, with trained assessors undertaking independent surveys following the course for verification by the trainers and also to start building a local site database.

⁹ Herlihy, A.T., Sifneos, J., Bason, C., Jacobs, A., Kentula, M.E., Fennessy, M.S. (2009). An approach for evaluating the repeatability of rapid wetland assessment methods: the effects of training and experience. *Environ. Manage.* 44 (2), 369–377.

15. The outputs from applying the RAWES approach can be used to inform subsequent quantitative assessments of targeted ecosystem services, by effectively providing an initial screening, or in more general local or national policy frameworks and decision-making process such as environmental impact assessments. It is recognized that rapid assessment does not replace a comprehensive field assessment.
16. The process for applying the RAWES approach comprises three principle activities: preparation, field assessment and information management (Table 3).

Table 3. Process for applying the RAWES approach.

Stage	Information
Preparation – key considerations	
Who will undertake the assessment?	<ul style="list-style-type: none"> • The assessment should be conducted by a minimum of two individuals working together. • The pair should be knowledgeable about the site and the type of wetland being assessed.
Where will the assessment be undertaken?	<ul style="list-style-type: none"> • The assessment should cover a defined area. • The level of significance of services with regards to number and range of beneficiaries and dis-beneficiaries needs to be determined prior to conducting the assessment. • The scales at which benefits are described (from local to global) need to be determined prior to conducting an assessment. • Ideally the area should be of a relative homogeneous habitat type but if it covers several different habitats this needs to be noted. • Health and safety considerations must be taken into account.
What is needed to undertake the assessment?	<ul style="list-style-type: none"> • Ensure that plenty of assessment sheets are available. • Use a clipboard and take several pens/pencils. • Take a camera and a GPS to record an image and the location. • Take appropriate personal protective equipment.
Field assessment – key considerations	
Observations	<ul style="list-style-type: none"> • Use field indicators to help recognize ecosystem services (see Appendix 2). • Understand the wider context of the site and the surrounding social and natural environment. • Think about the scale at which the service may be providing benefits. • Record actual, not potential, services. If there is no evidence do not record the service but make a note for future reference.
Indigenous and local knowledge	<ul style="list-style-type: none"> • Use local knowledge of how the site functions and how local communities interact with it.
Discussions	<ul style="list-style-type: none"> • Ensure that the assessors discuss issues between themselves and make reasoned conclusions.

Stage	Information
Stakeholder engagement	<ul style="list-style-type: none"> • Wherever possible engage with local stakeholders to understand better the relationship between people and the wetland. • Think about a hierarchy of stakeholders, from local (living/working in an immediately around the wetland), regional (those downstream and upstream of the wetland or in the wider region) and global (stakeholders and beneficiaries beyond national boundaries).
Recording information	<ul style="list-style-type: none"> • Ensure that as much information as possible is recorded so that others can understand the rationale for any assessments made.
Information management – key considerations	
Data checking	<ul style="list-style-type: none"> • Before leaving the field, check that all the required information has been recorded.
Data entry	<ul style="list-style-type: none"> • Ensure all data are entered onto Excel spreadsheets. • Use one spreadsheet for each assessment location. • Work in pairs to enter data. • If necessary check latitude/longitude on Google Earth.
Summarizing for future use	<ul style="list-style-type: none"> • Make a summary of the any key issues recorded such as constraints, uncertainties, impacts, threats etc.

Appendix 1. RAWES Field assessment sheet

Note: The list of ecosystem services provided under the RAWES approach differs partly from that used in the RIS and therefore should be considered as an example which should be adapted as appropriate to satisfy the relevant situation. For instance, where the RAWES approach is being used to inform the RIS then it is appropriate to make the modification required to ensure that all relevant ecosystem services are assessed.

RAPID ASSESSMENT OF WETLAND ECOSYSTEM SERVICES FIELD ASSESSMENT SHEET						
Key	How important?	Wetland name:	Scale of benefit			
			How important?	Describe benefit	Local	Regional
++	Significant positive benefit	GPS				
+	Positive benefit	coordinates				
0	Negligible benefit	Date :				
-	N benefit					
--	Significant negative benefit	Assessors :				
?	Gaps in evidence					
Provisioning services	Fresh water					
	Food					
	Fuel					
	Fibre					
	Genetic resources					
	Natural medicines or pharmaceuticals					
	Ornamental resources					
	Clay, mineral, aggregate harvesting					
	Energy harvesting from natural air and water flows					
Regulatory services	Air quality regulation					
	Local climate regulation					
	Global climate regulation					
	Water regulation					
	Flood hazard regulation					
	Storm hazard regulation					
	Pest regulation					
	Disease regulation – human					
	Disease regulation – livestock					
	Erosion regulation					
	Water purification					
Pollination						

	Salinity regulation					
	Fire regulation					
	Noise and visual buffering					
Cultural services	Cultural heritage					
	Recreation and tourism					
	Aesthetic value					
	Spiritual and religious value					
	Inspiration value					
	Social relation					
	Educational and research					
	Soil formation					
Supporting services	Primary production					
	Nutrient cycling					
	Water recycling					
	Provision of habitat					
Notes :						

Appendix 2. The example list of wetland ecosystem services considered by the RAWES approach and examples of the indicator questions considered.

	Ecosystem service	Example	Examples of questions assessors can ask about this service
Provisioning services	Provision of fresh water	Water used for domestic drinking supply, for irrigation, for livestock etc.	<ul style="list-style-type: none"> • Does the wetland provide a source of fresh water? • Does the wetland store fresh water for human use? • Is the wetland a net source of pollution, degrading fresh water provision?
	Provision of food	Crops, fruit, fish etc.	<ul style="list-style-type: none"> • What is grown in the wetland, either formally or from informal harvesting? • Are animals harvested from the wetland? • Are livestock using the wetland?
	Provision of fibre	Timber for building, wool for clothing etc.	<ul style="list-style-type: none"> • Are any natural materials such as wood, fibre, straw, animal fibre (wool/hide/sinew/antler/other) taken from the wetland?
	Provision of fuel	Fuelwood, peat etc.	<ul style="list-style-type: none"> • Is any material taken from the wetland and used as fuel for domestic or other uses?
	Provision of genetic resources	Rare breeds used for crop/stock breeding etc.	<ul style="list-style-type: none"> • Are any native or rare strains of plants and animals, wild and domesticated, which could contribute genetic diversity for human uses (for instance for drug manufacture, improving resilience of domestic animals and plants, horticultural trade etc.)
	Provision of natural medicines and pharmaceuticals	Plants used as traditional medicines etc.	<ul style="list-style-type: none"> • Are there any plants, animals or their parts derived from the wetland which are harvested and used for their medicinal properties?
	Provision of ornamental resources	Collection of shells, flowers etc.	<ul style="list-style-type: none"> • Are there any plants, animals or their parts derived from the wetland that are collected and used/sold for their ornamental properties?
	Clay, mineral, aggregate harvesting	Sand and gravel extracted for building use, clay extracted for brick-making etc.	<ul style="list-style-type: none"> • What substances are extracted or dug up from the wetland for construction or other human uses?
	Energy harvesting from natural air and water flows	Water wheels driven by flowing water, windmills driven by the wind etc.	<ul style="list-style-type: none"> • Are any technologies (water wheels, wind turbines etc.) used to capture natural flows of energy through or across the wetland?
Regulating services	Air quality regulation	Removal of airborne particles from the exhaust of cars, chimneys of industry, dust from agricultural land etc.	<ul style="list-style-type: none"> • Is there a source for airborne pollutants? • Does the wetland habitat structure help to settle out airborne pollutants? • Does the state of the wetland make it a source of air pollutants (microbial, particulate or chemical)?
	Local climate regulation	Regulation of the local microclimate, through shading, reducing air temperature etc.	<ul style="list-style-type: none"> • Does the wetland habitat structure provide shade for humans? • Does the wetland have areas of standing water with or without vegetation that will be generating evapotranspiration and consequently reducing air temperatures?
	Global climate regulation	Regulation of the global climate through control of greenhouse gas emissions, the sequestration of carbon etc.	<ul style="list-style-type: none"> • Does the wetland store and/or sequester carbon? • Does this balance with generation of methane and other greenhouse gases?
	Water regulation	Regulation of flows of surface water during high and low flows, regulation of recharge of groundwater etc.	<ul style="list-style-type: none"> • Do the topography, permeability and roughness of the wetland enable it to store water during high rainfall/discharge and to slowly release it back to surface waters or to groundwater? • Does the wetland regulate discharges during dry periods to buffer low flows during dry weather?
	Flood hazard regulation	Regulation and storage of flood water, regulation of intense rainfall events etc.	<ul style="list-style-type: none"> • Does the wetland regulate, store and retain floodwaters? • Does the wetland store rainfall and surface water that might contribute to flooding and damage to property or ecosystems downstream?
	Storm hazard	Regulation of tidal or storm	<ul style="list-style-type: none"> • Does the complexity of habitat, particularly trees, tall

	Ecosystem service	Example	Examples of questions assessors can ask about this service
	regulation	surges, regulation of extreme winds etc.	reeds and other vegetation and surface topography, absorb energy from extreme events such as storms and waves that might otherwise damage property or adjacent ecosystems?
	Pest regulation	Control of pest species such as mosquitoes, rats, flies etc.	<ul style="list-style-type: none"> Do natural predation and other ecological processes in the wetland regulate and control pest organisms? Is the wetland a source of pests (for example rats thriving in dirty water systems)?
	Regulation of human diseases	Presence of species that control the species (vectors) that transmit human diseases such as malaria, West Nile fever, dengue fever, Zika virus, leptospirosis, schistosomiasis etc.	<ul style="list-style-type: none"> Do natural predation and other ecological processes in the wetland regulate organisms that may cause human diseases? Are faecal deposits, bacteria or other potentially pathogenic microbes immobilized by processes in the wetland? Is the condition of the wetland contributing to the negative spread of populations of disease vectors (such as mosquitoes)?
	Regulation of diseases affecting livestock	Presence of species that control the species (vectors) that transmit diseases to livestock such as leptospirosis, schistosomiasis, duck virus enteritis, highly pathogenic avian influenza, tick-borne diseases etc.	<ul style="list-style-type: none"> Do natural predation and other ecological processes in the wetland regulate organisms that may cause diseases in livestock? Are faecal deposits, bacteria or other potentially pathogenic microbes immobilized by processes in the wetland? Is the condition of the wetland contributing to the negative spread of populations of disease vectors (such as mosquitoes or snails)?
	Erosion regulation	Regulation of energy environment to reduce risk of erosion, presence of dense vegetation protecting soils etc.	<ul style="list-style-type: none"> Does the wetland vegetation provide protection from erosion for the soils? Are there any signs of erosion, such as bare earth, in the wetland?
	Water purification	Cleaning of water, improvement of water quality, deposition of silts, trapping of contaminants and pollutants etc.	<ul style="list-style-type: none"> Do physico-chemical (sunlight exposure in shallow waters, detention of water in aerobic and anaerobic microhabitats) and biological processes in the wetland result in the breakdown of organic, microbial and other pollutants in the water passing through? Are suspended solids deposited? Is there a noticeable change in the quality, such as the turbidity, of water entering and leaving the wetland?
	Pollination	Pollination of plants and crops by pollinators such as bees, butterflies, wasps etc.	<ul style="list-style-type: none"> Do populations of pollinating organisms (butterflies, wasps, bees, bats etc.) in the wetland contribute to pollination within the wetland? Do pollinators using the wetland also help to pollinate nearby crops, gardens, allotments etc.?
	Salinity regulation	Freshwater in the wetland provides a barrier to saline waters.	<ul style="list-style-type: none"> Does the hydrology of the wetland help prevent saline water contaminating freshwaters? Does the presence of freshwater in the wetland prevent the salinization of soils? In tidal wetlands are there man-made or man-altered barriers (levies, roads, railroads) that interrupt connectivity with tidal water?
	Fire regulation	Providing physical barriers to the spread of fire, maintaining wet conditions to prevent fires spreading etc.	<ul style="list-style-type: none"> Does the configuration of waterbodies (ditches, streams etc.) help to prevent the spread of fires? Is there water at or near the soil surface that restricts the spread of fire? Are organic rich or peat soils drained and susceptible to fire and burning?

	Ecosystem service	Example	Examples of questions assessors can ask about this service
	Noise and visual buffering	Wetland trees or tall reeds absorbing and buffering the impact of noise.	<ul style="list-style-type: none"> • Is there a source (busy road, industry, construction etc.) and receptor (houses, wildlife etc.) for noise pollution? • Does wetland ecosystem structure, particularly tall trees and reeds, provide visual screening as well as suppress noise transmission?
Cultural services	Cultural heritage	Importance of the wetland for historical or archaeological value, as an example of traditional uses or management practices, as a cultural landscape etc.	<ul style="list-style-type: none"> • Does the wetland system have cultural importance, either due to its natural character or traditional uses?
	Recreation and tourism	Importance of the wetland for providing a location for recreation such as fishing, watersports or swimming, or as a tourism destination etc.	<ul style="list-style-type: none"> • Is the wetland used for organized or informal recreational purposes? • Is there infrastructure provided for access and recreation? • Are their wider tourism/ecotourism benefits flowing from these uses?
	Aesthetic value	The wetland is overlooked by properties, is part of a known area of natural beauty, is used as a subject by painters and artists etc.	<ul style="list-style-type: none"> • Does the wetland provide aesthetic benefits through the desirability of siting houses of commercial development adjacent to it? • Does the presence of a wetland have a significant impact on property prices? • Is the wetland depicted in many works of art?
	Spiritual and religious value	The wetland plays a role in local religious festivals, the wetland is considered as a sacred site, the wetland forms part of a traditional belief system etc.	<ul style="list-style-type: none"> • What spiritual or religious values do people derive from the wetland? • Does the wetland hold any important spiritual or cultural value to people? • Does the wetland play any part in traditional religious ceremonies? • Are there any traditional wetland management practices (such as the timing of planting and cropping of rice according to Buddhist or other traditions and teachings) associated with the wetland?
	Inspirational value	Presence of local myths or stories relating to the wetland, traditional oral or written histories about the wetland or wetland animals, creation of different art forms associated with the wetland, development of distinct architecture based on the wetland etc.	<ul style="list-style-type: none"> • Are there any particular myths or other folklore associated with the wetland? • Do any wetland animals appear or are any featured in local stories and myths? • Does the wetland inspire people to create music or other forms of art? • Have particular ways of designing and building developed which reflect the wetland?
	Social relations	Presence of fishing, grazing or cropping communities which have developed within and around the wetland.	<ul style="list-style-type: none"> • Have communities formed around the wetland and its uses, including for example fishing (subsistence, commercial and recreational), cropping or stock management, walking and jogging, birdwatching and photography etc?
	Educational and research	Use of the wetland by local school children for education, site of long-term research and monitoring, site visited by organized educational study tours etc.	<ul style="list-style-type: none"> • Is the wetland used for any educational purposes, organized or informal, ranging from school-level visits to university research and teaching? • Are there any public awareness or educational materials present?

	Ecosystem service	Example	Examples of questions assessors can ask about this service
Supporting services	Soil formation	Deposition of sediment, accumulation of organic matter etc.	<ul style="list-style-type: none"> Do accretion processes (both sedimentation of mineral material and the build up of organic material) on the wetland result in the formation of soils?
	Primary production	Presence of primary producers such as plants, algae etc.	<ul style="list-style-type: none"> Do photosynthetic processes on the wetland produce organic matter and store energy in biochemical form?
	Nutrient cycling	Source of nutrients present from inputs from agricultural land, internal cycling of plant material, inputs of nutrients from floodwaters, presence of fauna to recycling nutrients etc.	<ul style="list-style-type: none"> Do wetland processes biochemically transform nutrients (for example nitrification/denitrification)? Are nutrients settled out in particulate forms, changing the characteristics of water passing through the system? Are there abundant invertebrates and detritivores that are decomposing and cycling organic material?
	Water recycling	Presence of wetland vegetation and open water result in evapotranspiration and local recycling of water, relatively closed canopies and low exposure to winds retains water in local cycles, sandy or coarse substrates allow exchange with groundwaters etc.	<ul style="list-style-type: none"> Does the structure of the wetland retain water in tight cycles (for example recapture of vapour produced by evapotranspiration)? Does the wetland enable exchanges with groundwater (either discharge or recharge)?
	Provision of habitat	Presence of locally important habitats and species, presence of species and habitats of conservation concern etc.	<ul style="list-style-type: none"> Does the wetland support a diversity of locally representative biodiversity (plants and animals)? Does the wetland support species which humans consider of conservation concern or as charismatic interests? Are there invasive plants and animals that pose a threat to ecosystem services and/or functions?