

Fact Sheet 1
Wetlands: Why should I care?

For the historical loss of wetlands:

How much wetland has the world lost? Long-term and recent trends in global wetland area, N. Davidson

Marine and Freshwater Research, 2014, 65 (pp. 934 and 940)

<http://dx.doi.org/10.1071/MF14173>

For global freshwater resources:

World Business Council for Sustainable Development: *Water Facts and Trends*, 2009 (p.3)

<http://www.wbcsd.org/Pages/EDocument/EDocumentDetails.aspx?ID=137>

For human basic daily water requirement:

World Health Organization: *Domestic Water Quantity, Service Level and Health* (p.3)

http://www.who.int/water_sanitation_health/diseases/WSH03.02.pdf

For worldwide per capita consumption of fish:

Food and Agriculture Organization of the U.N.: *Fish Trade and Human Nutrition* (p.2)

<http://www.fao.org/cofi/29401-083ff934c3ccfd8576005d8d0c19b04d6.pdf>

For share of commercial fish species dependent on wetlands:

U.S. Environmental Protection Agency: Watershed Academy Web
Wetland Functions and Values (p.11)

<http://cfpub.epa.gov/watertrain/pdf/modules/WetlandsFunctions.pdf>

For dependence on rice as food source:

Food and Agriculture Organization of the U.N.: *Global climate changes and rice food security* (p.25)

<http://www.fao.org/forestry/15526-03ecb62366f779d1ed45287e698a44d2e.pdf>

For rice as proportion of worldwide dietary intake:

Food and Agriculture Organization of the U.N.: *Rice and human nutrition fact sheet*

<http://www.fao.org/rice2004/en/f-sheet/factsheet3.pdf>

For dependence on groundwater in Asia:

Institute for Global Environmental Strategies White Paper, Chapter 7: *Groundwater and climate change: no longer the hidden resource* (p.160)

http://pub.iges.or.jp/modules/envirolib/upload/1565/attach/09_chapter7.pdf

For dependence on groundwater in the European Union and the European population:

<http://ec.europa.eu/environment/water/water-framework/groundwater/resource.htm>

http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Population_and_population_change_statistics

For peatlands and carbon sequestration:

Ramsar Convention on Wetlands: *TEEB: The Economics of Ecosystems and Biodiversity for Water and Wetlands* (p.11)

http://www.ramsar.org/sites/default/files/documents/library/teeb_waterwetlands_report_2013.pdf

For number of freshwater species:

Millennium Ecosystem Assessment: *Ecosystems and Human Well-Being: Wetlands and Water* (p.26)

<http://www.millenniumassessment.org/documents/document.358.aspx.pdf>

For discovery of new fish species:

World Wide Fund for Nature: *Amazon Alive!: A Decade of Discoveries 1999-2009*

http://assets.panda.org/downloads/amazon_alive_web_ready_sept23.pdf

For fishing industry direct employment:

Food and Agriculture Organization of the U.N.: *State of World Fisheries and Aquaculture 2012* (p.41)

<http://www.fao.org/docrep/016/i2727e/i2727e.pdf>

For number of fishing industry dependents:

Food and Agriculture Organization of the U.N.: *Fish Trade and Human Nutrition* (p.2)

<http://www.fao.org/cofi/29401-083ff934c3ccfd8576005d8d0c19b04d6.pdf>

Fact Sheet 2

Wetlands: wise use basics on site

For wise use practices summarised from 4th edition of *Ramsar Wise Use Handbooks*, primarily from:

Handbook 1 *Wise use of wetlands*

Handbook 7 *Participatory skills*

Handbook 10 *Water allocation and management*

Handbook 18 *Managing wetlands*

www.ramsar.org/wise-use-wetlands



Fact Sheet 3

Wetlands: a worldwide disappearing act

For the historical loss of wetlands:

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Marine and Freshwater Research, 2014, 65 (pp. 934 and 940)

<http://dx.doi.org/10.1071/MF14173>

For loss in freshwater species populations:

World Wide Fund for Nature: *Living Planet Report 2014* (p. 22)

http://wwf.panda.org/about_our_earth/all_publications/living_planet_report/

For the Wetlands Extent Index:

Convention on Biological Diversity: Technical Series No. 78, *Progress Towards the Aichi Biodiversity Targets: An assessment of biodiversity trends, policy scenarios and key actions* (p.99)

www.cbd.int/doc/publications/cbd-ts-78-en.pdf

For categories of U.S. wetland loss:

U.S. Fish & Wildlife Service: *Status and Trends of Wetlands in the Conterminous United States 1998 to 2004* (p.44)

<http://www.fws.gov/wetlands/Documents/Status-and-Trends-of-Wetlands-in-the-Conterminous-United-States-1998-to-2004.pdf>

U.S. Fish & Wildlife Service: *Status and Trends of Wetlands in the Conterminous United States 2004 to 2009* (p.42)

<http://www.fws.gov/wetlands/Documents/Status-and-Trends-of-Wetlands-in-the-Conterminous-United-States-2004-to-2009.pdf>

Fact Sheet 4

Wetlands: What can I do?

This sheet contains no statistical references.

Fact Sheet 5

Coral reefs: critical wetlands in severe danger

For basic information about coral reefs formation:

US National Oceanic and Atmospheric Administration (NOAA), Coral Reef Conservation Programme, *Symbiotic Algae*,

<http://coralreef.noaa.gov/aboutcorals/coral101/symbioticalgae/>



For number of coral reefs within Ramsar Sites:

Ramsar Sites Information Service,

<https://rsis.ramsar.org/> (searched Ramsar Sites with a presence of coral reefs by wetland type: type A, permanent shallow marine waters; type B, marine subtidal aquatic beds (underwater vegetation); type C, coral reefs; type F, estuaries; type G, intertidal mud, sand or salt flats; type h, intertidal marshes; type I, intertidal forested wetlands; and type J, Coastal brackish / saline lagoons).

For number of people dependent on coral reefs:

Wilkinson, C. (2008). *Status of coral reefs of the world: 2008*. Global Coral Reef Monitoring Network and Reef and Rainforest Research Centre, Townsville, Australia, p. 33,

http://www.icriforum.org/sites/default/files/GCRMN_Status_Coral_Reefs_2008.pdf

For percentage of coral reefs in *Southeast Asia and Pacific regions*:

Andréfouët, S., et al. (2006). *Global assessment of modern coral reef extent and diversity for regional science and management applications: a view from space*, in: Suzuki, Y., et al. (Eds.) 10th ICRS. Japanese Coral Reef Society, Okinawa, Japan, pp. 1732-1745

UNEP-WCMC, WorldFish Centre, WRI, TNC (2010). *Global distribution of warm-water coral reefs, compiled from multiple sources including the Millennium Coral Reef Mapping Project*. Includes contributions from IMaRS-USF and IRD (2005), IMaRS-USF (2005) and Spalding et al. (2001). Cambridge, UK,

<http://data.unep-wcmc.org/datasets/1>

For value of coral-related tourism in Belize in 2007:

Russi, D., et al. (2013). *The Economics of Ecosystems and Biodiversity for Water and Wetlands*. IEEP, London and Brussels; Ramsar Secretariat, Gland, Switzerland (p.28),

http://www.ramsar.org/sites/default/files/documents/library/teeb_waterwetlands_report_2013.pdf

For the production of seafood in Indian and Pacific Ocean coral reefs:

Bell, J., Kronen, M., Vunisea, A., Nash, W., G. K., Demnke, A., Pontifex, S., Andréfouët, S., 2009. *Planning the use of fish for food security in the Pacific*. Marine Policy 33, 64-76,

<http://www.sciencedirect.com/science/article/pii/S0308597X08000778>

Newton, K., Côté, I., Pilling, G., Jennings, S., Dulvy, N., 2007. *Current and future sustainability of island coral reef fisheries*. Current Biology 17, 655-658.

[http://ac.els-cdn.com/S0960982207010639/1-s2.0-S0960982207010639-main.pdf?_tid=bc29196c-ccbe-11e4-8d65-](http://ac.els-cdn.com/S0960982207010639/1-s2.0-S0960982207010639-main.pdf?_tid=bc29196c-ccbe-11e4-8d65-00000aab0f02&acdnat=1426608210_ed7367e8acbb9ec2f6bf4d9b0acac371)

[00000aab0f02&acdnat=1426608210_ed7367e8acbb9ec2f6bf4d9b0acac371](http://ac.els-cdn.com/S0960982207010639/1-s2.0-S0960982207010639-main.pdf?_tid=bc29196c-ccbe-11e4-8d65-00000aab0f02&acdnat=1426608210_ed7367e8acbb9ec2f6bf4d9b0acac371)



For a greater estimate see: Russi, D., et al. (2013). *The Economics of Ecosystems and Biodiversity for Water and Wetlands*. IEEP, London and Brussels; Ramsar Secretariat, Gland, Switzerland (p.11),
http://www.ramsar.org/sites/default/files/documents/library/teeb_waterwetlands_report_2013.pdf

For global monetary comparison of ecosystem services of corals:
de Groot R., et al. (2012). *Global estimates of the value of ecosystems and their services in monetary units*. Ecosystem Services 1, (Figure 3),
<http://www.sciencedirect.com/science/article/pii/S2212041612000101#t0015>

For percentage of corals at risk at percentage already beyond repair:
Burke, L. et al. (2011), *Reefs at Risk Revisited*, World Resources Institute (WRI), Washington, D.C. (p.3),
<http://www.wri.org/publication/reefs-risk-revisited>

For the effect of ocean acidification on corals
Burke, L. et al. (2011), *Reefs at Risk Revisited*, World Resources Institute (WRI), Washington, D.C. (p.2),
<http://www.wri.org/publication/reefs-risk-revisited>

For deterioration in coral cover between 1980 and 2004
Russi, D., et al. (2013). *The Economics of Ecosystems and Biodiversity for Water and Wetlands*. IEEP, London and Brussels; Ramsar Secretariat, Gland, Switzerland (p.15),
http://www.ramsar.org/sites/default/files/documents/library/teeb_waterwetlands_report_2013.pdf

For details on the Kuruwitu Marine Sanctuary:
Kuruwitu Conservation and Welfare Association,
<http://kuruwitu.org>

Rocliffe S., Peabody S., Samoily M. and Hawkins JP. (2014). *Towards a Network of Locally Managed Marine Areas (LMMAs) in the Western Indian Ocean*. PLoS ONE 9(7): e103000, [doi:10.1371/journal.pone.0103000](https://doi.org/10.1371/journal.pone.0103000)

For details on the Jardines de la Reina National Park:
Handbook on the Economics of Ecosystem Services and Biodiversity (2014). Nunes, P., A.L.D., Kumar, P., Dedeurwaerdere, T. (p. 437),
https://books.google.de/books?id=Sg_oAwAAQBAJ&pg=PA437&lpg=PA437&dq=jardines+de+la+reina+national+park&source=bl&ots=ziu2FdX-zZ&sig=eVSLJRTSORS4MwjBXU-Kt2ARwWA&hl=en&sa=X&ei=s6IBVabOGYm9UeTzgYgE&ved=0OCGEQ6AEwCQ#v=onepage&q=jardines%20de%20la%20reina%20national%20park&f=false

Pina-Amargós, S. (2014). *Evidence for protection of targeted reef fish on the largest marine reserve in the Caribbean*, Peer J 2:e274,
<https://dx.doi.org/10.7717/peerj.274>

Fact Sheet 7

Wetlands: Source of sustainable livelihoods

For employment of rice sectors and percentage of rice cultivated by small-scale farmers:

Food and Agriculture Organization of the U.N.: 2003 International Rice Commission Newsletter, Vol. 52 (p.3)

<ftp://ftp.fao.org/docrep/fao/006/y5167E/y5167E00.pdf>

For percentage of fish raised under aquaculture:

Food and Agriculture Organization of the U.N.: World Review of Fisheries and Aquaculture (from tables on p.3)

<http://www.fao.org/docrep/016/i2727e/i2727e01.pdf>

For number of fishing industry dependents:

Food and Agriculture Organization of the U.N.: Fish Trade and Human Nutrition (p.2)

<http://www.fao.org/cofi/29401-083ff934c3ccfd8576005d8d0c19b04d6.pdf>

For proportion of international tourists visiting wetlands

UN World Tourism Organization and Ramsar Convention: Destination Wetlands – Supporting Sustainable Tourism (p.15)

http://dtxqt4w60xqpw.cloudfront.net/sites/all/files/pdf/ramsar_unwto_tourism_en.pdf

For travel and tourism employment:

World Travel & Tourism Council: Travel and Tourism Economic Impact 2014 – World

<http://www.wttc.org/-/media/files/reports/economic%20impact%20research/regional%20reports/world2014.pdf>

For Bangkok Metropolitan Waterworks Authority employees:

http://www.mwa.co.th/download/pln0201/annual_web2014_e/#p=40

For Danone's bottled water-related employees worldwide:

<http://www.danone.com/en/for-all/our-4-business-lines/waters/strategy-key-figures/>

For the historical loss of wetlands:

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Marine and Freshwater Research, 2014, 65 (pp. 934 and 940)
<http://dx.doi.org/10.1071/MF14173>

For proportion of world population facing water stress or scarcity in 2025:
Worldwide Fund for Nature website article: Freshwater: what's at stake, what we're missing, what we're losing, what it's worth
http://wwf.panda.org/about_our_earth/about_freshwater/importance_value/

For three characteristics of sustainable development:
United Nations General Assembly: 2005 World Summit Outcome, Resolution A/60/1
http://data.unaids.org/Topics/UniversalAccess/worldsummitoutcome_resolution_24oct2005_en.pdf

Basis for description of ingredients to creating sustainable livelihoods (frameworks):
International Fund for Agricultural Development Sustainable Livelihoods Approach:
<http://www.ifad.org/sla/>
DFID Sustainable Livelihoods Framework
<http://www.eldis.org/vfile/upload/1/document/0901/section2.pdf>

For types of 'capital' essential to sustainable livelihoods in wetlands:
Ramsar Convention: An integrated framework for linking wetland conservation and wise use with poverty reduction. Resolution XI.13, 2012 (p.7)
<http://www.ramsar.org/sites/default/files/documents/pdf/guide/guide-poverty-e.pdf>

For information on the Senegal mangrove restoration project:
<http://www.livelihoods.eu/portfolio/oceanium-senegal/>

For information on the Tamar project including staff statistics:
Tamar website
http://www.tamar.org.br/interna_ing.php?cod=163

Fact Sheet 8

Keep peatlands wet for a better future

For a general review of peatlands, their biodiversity and ecosystem services:
Parish, F., Sirin, A., Charman, D., Joosten, H., Minayeva, T. and Silviu, M. (eds.)
(2007) *Assessment on Peatlands, Biodiversity and Climate Change: Executive Summary*. Global Environment Centre, Kuala Lumpur and Wetlands International, Wageningen.
<http://gec.org.my/index.cfm?&menuid=48>

For a comprehensive range of detailed information about peatlands, the global peat resource, peatland ecosystem services and the consequences of damaging peatland ecosystems:



Joosten, H. and Clarke, D. (2002) *Wise Use of Mires and Peatlands*. NHBS, Totness, Devon : International Mire Conservation Group and International Peat Society.

http://www.imcg.net/media/download_gallery/books/wump_wise_use_of_mires_and_peatlands_book.pdf

For some of the latest figures concerning global soil organic carbon and the contribution made by peatlands to this carbon stock:

Scharlemann, J.P.W., Tanner, E.V.J., Hiederer, R. and Kapos, V. (2014) Global soil carbon: understanding and managing the largest terrestrial carbon pool. *Carbon Management*, **5**(1), pp. 81-91.

<http://www.tandfonline.com/doi/pdf/10.4155/cmt.13.77>

For descriptions of subsidence and shrinkage associated with peatland drainage:

Anderson, A.R., Ray, D. and Pyatt, D.G. (2000) Physical and hydrological impacts of blanket bog afforestation at Bad á Cheo, Caithness: the first 5 years. *Forestry*, **73** (5), 467-478.

Eggelsmann, R. (1975) Physical effects of drainage in peat soils of the temperate zone and their forecasting. In: *Hydrology of Marsh-Ridden Areas : Proceedings of a symposium held in Minsk, 1972*. pp. 69-76. Co-edition IAHS/UNESCO Studies and reports in hydrology 19, Publication 105. Paris : The UNESCO Press.

Available to download from:

<http://unesdoc.unesco.org/images/0001/000158/015877eo.pdf>

Fillenham, L.F. (1963) Holme Fen Post. *The Geographical Journal*, **129**, 4, pp.502-503.

Graham, R.B. and Hicks, W.D. (1980) Some observations on the changes in volume and weight of peat and peat moss with loss of moisture. In: International Peat Society, *Proceedings of the 11th International Peat Congress, The role of Peatlands in a world of limited resources- energy, food, fiber and natural areas*: Duluth, U.S.A, 17-23 August 1980. International Peat Society.

Hobbs, N.B. (1986) Mire morphology and the properties and behaviour of some British and foreign peats. *Quarterly Journal of Engineering Geology*, **19**, 7-80.

Inoue, T. and Obana, K. (2004) Peatland subsidence after 40 years of agricultural development in Ishikari mire complex, Hokkaido, Japan. *Hydrological processes*. **13**, 2591-2601.

Lindsay, R., Birnie, R. and Clough, J. (2014) [Peat Bog Ecosystems: Impacts of Artificial Drainage on Peatlands](#). Technical Report. International Union for the Conservation of Nature, Edinburgh.

<http://roar.uel.ac.uk/view/creators/Lindsay=3ARichard=3A=3A.html>



van der Schaaf, S. (2000) Subsidence along disturbed bog margins and its expansion into bogs. **In:** International Peat Society, *Proceedings of the 11th International Peat Congress: Sustaining our Peatlands*. 2000. Quebec: Canadian Society of Peat and Peatlands, pp.262-268.

For accounts of carbon storage, carbon balance and carbon emissions from peatlands subject to a range of impacts:

Alm, J., Shurpali, N.J., Minkkinen, K., Aro, L., Hytonen, J., Laurila, T., Lohila, A., Maljanen, M., Martikainen, P.J., Makiranta, P., Penttila, T., Saarnio, S., Silvan, N., Tuittila, E. and Laine, J. (2007) Emission factors and their uncertainty for the exchange of CO₂, CH₄ and N₂O in Finnish managed peatlands. *Boreal Environment Research*, **12**(2), 191-209.

Cleary, J., Roulet, N.T. and Moore, T.R. (2005) Greenhouse Gas Emissions from Canadian Peat Extraction, 1990-2000: A Life-cycle Analysis. *Ambio*, **34** (6), 456-461.

Dommain, R., Couwenberg, J., Glaser, P.H., Joosten, H. and Suryadiptura, I.N.N. (2014) Carbon storage and release in Indonesian peatlands since the last deglaciation. *Quaternary Science Reviews*, **97**, 1-32.

Holden, J. (2005) Peatland hydrology and carbon release: why small-scale process matters. *Philosophical Transactions of the Royal Society*, **363**, 2891-2913.
<http://www.geog.leeds.ac.uk/people/jholden/publications.html>

Joosten, H. (2009) *The Global Peatland CO₂ Picture – Peatland status and drainage related emissions in all countries of the world*. Wetlands International, Ede.
http://www.imcg.net/media/download_gallery/climate/joosten_2009.pdf

Kasimir-Klemedtsson, Å., Klemedtsson, L., Berglund, K., Martikainen, P., Silvola, J. and Oenema, O. (1997) Greenhouse gas emissions from farmed organic soils: a review. *Soil Use and Management*, **13**, 245-250.

Lindsay, R.A. (2010) *Peatbogs and Carbon: A Critical Synthesis*. Edinburgh : Royal Society for the Protection of Birds.
<http://www.uel.ac.uk/erg/Onlinereports.htm>

Mäkiranta, P., Hytönen, J., Aro, L., Maljanen, M., Potila, H., Shurpali, N.J., Lohila, A. and Martikainen, K. (2007) Soil greenhouse gas emissions from afforested organic soil croplands and cutaway peatlands. *Boreal Environment Research*, **12**, 159-175.

Oleszczuk, R., Regina, K., Szajdak, L., Hoper, H. and Maryganova, V. (2008) Impacts of agricultural utilization of peat soils on the greenhouse gas balance. **In:** M. Strack (ed.) *Peatlands and Climate Change*. Saarijarvi. Saarijaven Offset Oy, pp.70-79.

For figures of carbon loss from Indonesian peat fires in 1997:

Page, S.E., Siegert, F., Rieley, J.O., Boehm, H-D.V., Jaya, A. and Limin, S. (2002) The amount of carbon released from peat and forest fires in Indonesia during 1997. *Nature*, **420**, 61-65.

For examples of peatland restoration:

Cris, R. Buckmaster, S. Bain, C. Reed, M. (eds) (2014) *Global Peatland Restoration demonstrating Success*. IUCN UK National Committee Peatland Programme, Edinburgh.

<http://www.iucn-uk-peatlandprogramme.org/publications/demonstrating-success/global-demonstrating-success>

Joosten, H., Tapio-Biström, M.-L. & Tol, S. (2012) Peatlands – guidance for climate change mitigation by conservation, rehabilitation and sustainable use. Food and Agriculture Organization of the United Nations (FAO), Rome.

<http://www.fao.org/docrep/015/an762e/an762e.pdf>

Similä, M, Aapala, K. & Penttinen, J. (eds) (2014) Ecological restoration in drained peatlands – best practices from Finland. Metsähallitus, Vantaa, 2014. 84 pp.

<http://julkaisut.metsa.fi/julkaisut/show/1733>

For figures of carbon exchange following peatland recovery/restoration:

Couwenberg, J., Thiele, A., Tanneberger, F., Augustin, J., Bärtsch, S., Dubovik, D., Liashchynskaya, N., Michaelis, D., Minke, M., Skuratovich, A. and Joosten, H. (2011) Assessing greenhouse gas emissions from peatlands using vegetation as a proxy. *Hydrobiologia*, 674, 67-89.

Wallage, Z.E., Holden, J. and McDonald, A.T. (2006) Drain blocking: An effective treatment for reducing dissolved organic carbon loss and water discolouration in a drained peatland. *Science of the Total Environment*, **367**, 811-821.

Yli-Petäys, M., Laine, J., Vasander, H. & Tuittila, E.-S. (2007) Carbon gas exchange of a re-vegetated cut-away peatland five decades after abandonment. *Boreal Environment Research*, **12**, 177–190.