3. DRIVERS OF CHANGE

There are three main drivers of change: direct drivers that create biophysical change in wetlands (land use change, pollution, etc.), indirect drivers that are the processes in society that create the direct drivers, and global megatrends that are behind several indirect drivers. Effective policy and management for wise use need a good understanding of the drivers of change in wetlands so that the root causes of wetland loss and degradation can be addressed. Effective governance at local, national and regional levels is a key factor for preventing, stopping and reversing the trend of wetland loss and degradation.

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Drivers in wetlands can be direct or indirect

For Ramsar, direct drivers refer to natural or human-induced causes of biophysical changes at a local to regional scale (Van Asselen et al. 2013). Indirect drivers have a broader, diffuse effect, mostly by influencing direct drivers, and often relate to institutional, socio-economic, demographic and cultural processes. Some global megatrends influence wetlands (Figure 3.1).

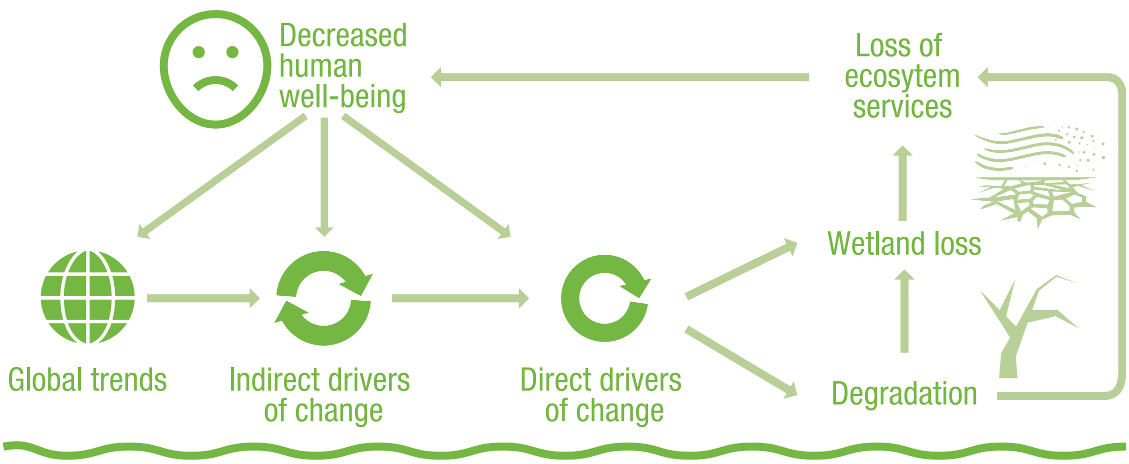
Natural drivers of change include solar radiation, weather variation, earthquakes, volcanic eruptions, pests and diseases, and processes such as natural flood cycles and ecosystem succession. Human-induced drivers include land use change, climate change, sea level rise, water abstraction, introduction or removal of species, resource consumption and external inputs (e.g., fertilizers). Climate *variability* is a natural driver, whereas human-induced climate *change* is associated with increased greenhouse gases in the atmosphere. Climate change is also a global megatrend.

Drivers can have both negative and positive effects. Here we focus on drivers with a negative effect on the ecological character of wetlands. These frequently involve declines in biodiversity, habitat quality, ecosystem services or cultural value ("degradation"), or shifts in habitat types or physico-chemical regimes ("loss"). Most positive drivers are human responses aimed at mitigating change (e.g., conservation management or invasive species control).

Our understanding is hampered by the complexity of the pathways from indirect drivers to wetland loss and degradation. Interactions between multiple drivers occur at a range of scales (Craig et al. 2017) and can lead to regional variation (Ward et al. 2016). Climate change, for example, can be a direct driver of change by causing biophysical changes, affecting temperature, water levels and hydroperiods (Renton et al. 2015), and can combine with other drivers such as invasive species (Oliver & Morecroft 2014). Climate change can also be an indirect driver; for example, mitigation efforts may include biofuel production and hydropower, which can increase pressures on wetlands.

Conversion of natural wetlands may lead directly or indirectly to the creation of human-made wetlands (Davidson 2014 and Table 2.3). Some of the latter have developed over hundreds of years and have become part of the landscape, performing many of the ecosystem functions of natural wetlands. However, many direct drivers of change in natural wetlands (changes in water supply, removal of vegetation or introduction of species or nutrients) are part of the management regime of human-made wetlands. Although human-made wetlands are important, they are largely beyond our scope and a separate assessment is needed. For similar reasons, wetland restoration, which can be a positive driver in degraded wetlands (e.g., Sievers et al. 2017), was not considered here.

Figure 3.1
Simplified conceptual diagram showing the relationships between wetland loss and degradation and the loss of ecosystem services, and how these are caused by direct and indirect drivers of change. (For a more detailed conceptual framework which presents terminology from the Millennium Ecosystem Assessment, TEEB and IPBES, see the IPBES conceptual framework in Díaz et al. (2015)).



Direct drivers include physical regime change

The Millennium Ecosystem Assessment (MEA 2005) analysed impacts of direct drivers on wetlands. We use this and other studies to update the analysis for Ramsar wetland types. Four categories are considered: *physical*, *extraction*, *introduction* and *structural change* drivers.

Physical regime drivers are factors related to inflow quantity and frequency, sediment load, salinity and temperature, whose conditions and pattern of variation can be altered by humans.

Prolonged or permanent **water abstraction**, interception or diversion destroys the ecological character of inland wetlands; the Aral Sea and Lake Chad being extreme examples. All wetlands are likely to be degraded by water loss (Acreman et al. 2007), while coastal wetlands are sensitive to sea level rise and freshwater abstraction (White & Kaplan 2017).

The construction of dams increased in all Ramsar regions until the mid-1990s. Of the 292 large river systems in the world (Nilsson et al. 2005), only 120 are still free-flowing, of which 25 will be fragmented by ongoing or planned dam construction (Zarfl et al. 2014). Recently there has been renewed interest in hydropower, partly to reduce carbon emissions from fossil fuels. However, hydropower is not always carbon-free because of land clearance and methane emissions from reservoirs (Mäkinen & Kahn 2010). Dams can also have detrimental impacts on water resources, biodiversity and ecosystem services (Maavara et al. 2017; Winemiller et al. 2016).

Sediment transport to wetlands can increase due to erosion from deforestation and other land use change. This can change lake character by modifying shore habitats, infilling or increasing turbidity. It is thought to be a factor in the decline of cichlid fish in Lake Victoria (Harrison & Stiassny 1999). It also degrades coastal ecosystems (Hanley et al. 2014), damaging seagrass beds, kelp forests (Steneck et al. 2002), mangroves and coral reefs (Fabricius 2005). Sedimentation reduces the lifetime of reservoirs, undermining hydropower projects (Stickler et al. 2013). Conversely, sediment supply to coastal wetlands and deltas can sometimes be reduced by dam and levee construction, diminishing nutrient supply and decreasing productivity.

Salinization due to freshwater abstraction, or saltwater intrusion from rising sea level (Herbert et al. 2015) influences many ecosystems ranging from forested, inland wetlands and estuaries to mangroves (White & Kaplan 2017).

Finally, **mean ocean temperature** has increased steadily over the last 60 years, affecting shallow marine water, seagrass beds (de Fouw et al. 2016) and kelp forests (Provost et al. 2017). Severe increases in magnitude and/or duration of maximum sea temperatures bleach or destroy coral systems (Baker et al. 2008).

Extraction from wetlands includes removal of water, species and soil

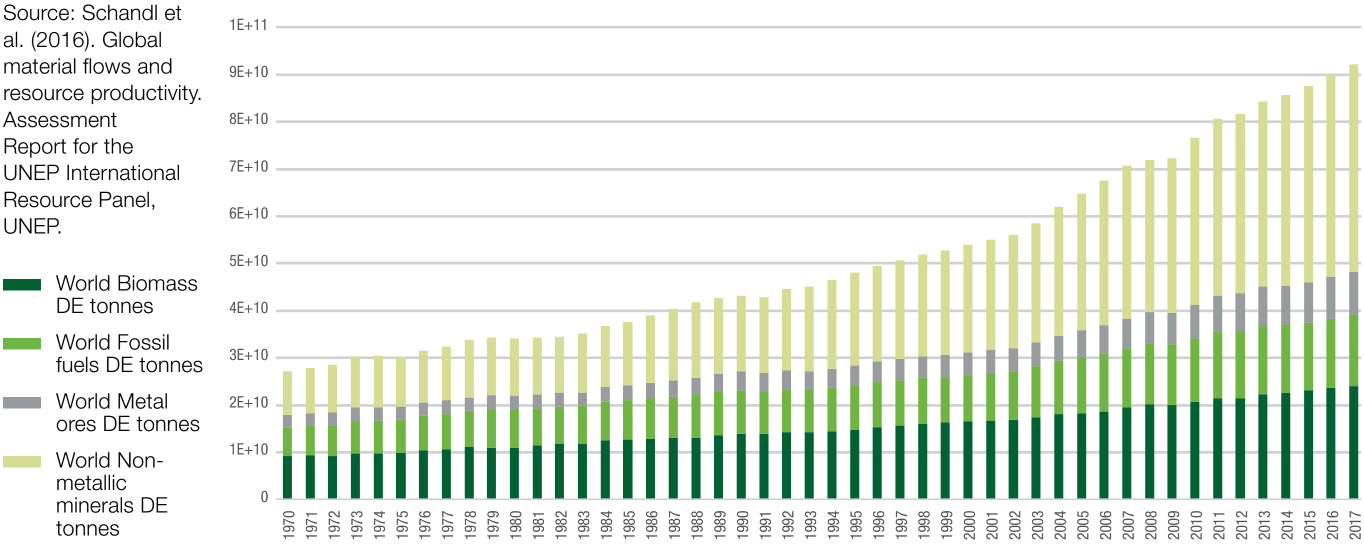
Water is extracted from inland wetlands and their catchments for agricultural, domestic and industrial use. Agriculture is currently responsible for about 70% of water extracted for human uses, but this proportion is expected to fall to less than 50% by the mid-21st century due to growth in urban, industrial and energy use (WWAP 2016). Amongst other impacts, freshwater extraction can cause the decline of coastal vegetation because of increased salinity in downstream reaches of estuaries (Herbert et al. 2015) and has effects on groundwater (Richey et al. 2015).

Global fishing catch from lakes, rivers, reservoirs and floodplains is increasing, mostly in Asia and Africa. Here, inland and coastal fisheries are important for food and livelihoods whereas in temperate zones and transitional economies recreational fishing is more important (McIntyre et al. 2016). While fishing is not necessarily detrimental, overfishing, use of harmful fishing methods such as explosives, poison or mosquito nets (Bush et al. 2017) and introduction of alien species can decrease populations and diversity, change trophic structure and lead to coral reef degradation (Welcomme et al. 2010). Overharvesting of shellfish from coastal wetlands has resulted in destruction of oyster reefs, for example in North America and Australia (Kirby 2004). Fishing for the aquarium trade can impoverish coral reefs (Dee et al. 2014).

Intensive wood harvesting for timber or charcoal in wetland forests or mangroves can cause major changes to ecological character (Walters 2005). Coral harvesting can lead to degradation and loss of coastal reefs (Tsounis et al. 2007). Peatlands are vulnerable to peat extraction, drainage and logging, for example in Borneo (Miettinen et al. 2013). The soil in many freshwater wetlands is used for brick making (Santhosh et al. 2013).

Sand and gravel harvesting from rivers and coasts are related to urban development and now exceed fossil fuel and biomass in terms of total mass extracted (Figure 3.2 and see Schandl et al. 2016). Sand mining disturbs and destroys benthic habitats and affects water quality through suspended sediments, with multiple ecological impacts. Because of the open nature of the resource, regulation is problematic and cases of illegal harvesting are increasing (Torres et al. 2017).

Figure 3.2
Global material flows and resource productivity.
Note: the non-metallic minerals include sand and gravel for land reclamation and construction and now exceed the other three categories.
Source: Schandl et al. (2016). Global material flows and resource productivity. Assessment Report for the UNEP International Resource Panel, UNEP.



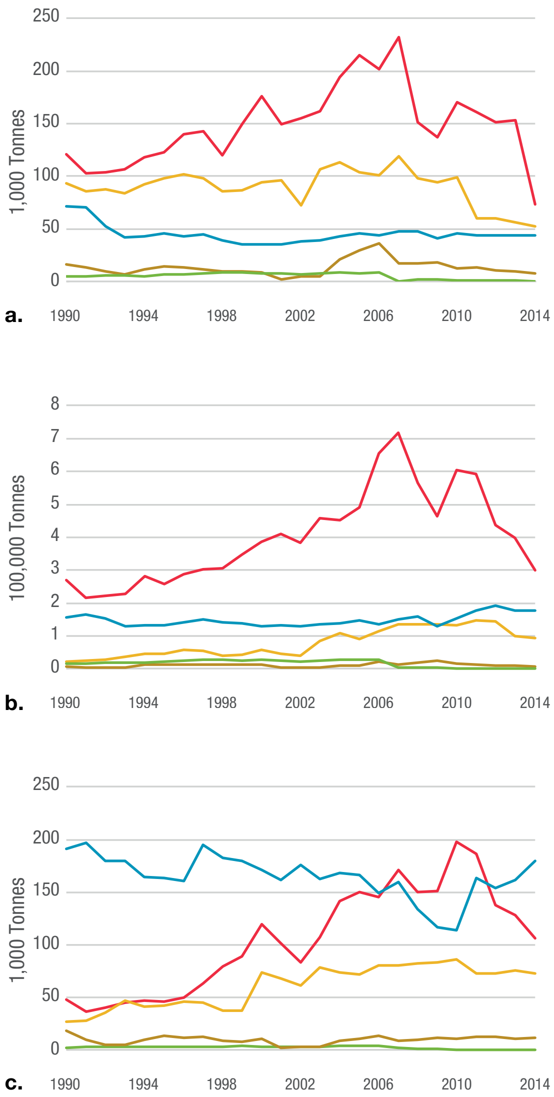
Pollutants and alien species degrade many wetlands

Introduction drivers include the addition of nutrients, chemicals and solid waste, atmospheric deposition and non-native species.

Excessive nutrients from sewage, industrial waste, agriculture or aquaculture cause eutrophication, changing biodiversity, water quality, biomass and oxygen levels. Global fertilizer use will likely exceed 200 million tonnes a year in 2018, some 25% higher than 2008 (FAO 2015; Figure 3.3). Atmospheric nitrogen deposition impacts aquatic systems and is increasing rapidly in fast-growing economies (Liu et al. 2011). Nutrient enrichment boosts algal and other plant growth; when plants die their decomposition reduces oxygen concentrations in the water. This affects many wetlands (Smith et al. 2006); for example cyanobacterial blooms in lakes (Paerl & Otten 2013). Hypoxia (oxygen starvation) in coastal ecosystems has increased (Rabalais et al. 2010); over 500 coastal "dead zones" are known (UNEP 2014a). Reef systems are impacted by increased sediment or nutrient levels, often from agriculture or urban/port infrastructure (Wenger et al. 2015).

Figure 3.3
Trends in agricultural chemical use, 1990-2014.
a. Insecticides
b. Herbicides
c. Fungicides and bactericides
Source: FAO (2016). FAOSTAT Inputs/ Pesticides Use. http://www.fao.org/faostat/en/#data/RP

Region
Africa
Americas
Asia
Europe
Oceania



Marine and urban waste damages coastal wetlands (Poeta et al. 2014). An estimated 4.8 to 12.7 million metric tonnes of plastic entered the marine environment in 2010 (Jambeck et al. 2015); 60-80% of total marine debris. Besides its physical impacts, there are concerns about the toxicological effects of chemicals associated with plastics (Beaman et al. 2016). Industrial, domestic and agricultural activities release pollutants, such as pesticides, leading to declines in diversity, populations and productivity (Zhang et al. 2011).

The introduction of invasive species can disrupt trophic structure, energy flows and species composition, as seen with invasive crayfish in the Okavango Delta, Botswana (Nunes et al. 2016). Numbers of established alien freshwater species have been increasing, e.g., with continuous increases in Europe especially in the last 60 years (Nunes et al. 2015). Wetlands are vulnerable to invasion because the combination of sediments, nutrients and water creates conditions – sometimes helped by disturbance – for opportunistic species to flourish (Zedler & Kercher 2004). Many lakes worldwide suffer from infestation with water hyacinth (*Eichornia crassipes*), originally native to South America. Multiple drivers impact Lake Victoria, East Africa, where introduced Nile perch (*Lates niloticus*) along with eutrophication, sedimentation and water level fluctuations, led to drastic changes in ecology (Kiwango & Wolanski 2008).

In shallow marine water, seagrass beds and kelp forests, **introduced biota** or changes in local species can degrade ecosystems (e.g., the so-called urchin barrens). The number of alien species in marine ecosystems has been increasing; 140 non-native species have been recorded in the Baltic Sea in Europe, of which 14 were introduced from 2011-2016 (HELCOM 2017).

Direct drivers also include structural changes to habitat

Structural change alters the ecological character of wetlands and their immediate environment, for example through drainage, conversion or burning of wetland vegetation. Often this leads to the loss of wetlands. Canalization, inundation or infilling is common in rivers, streams and floodplains. Conversion to other land uses such as plantation forestry, agricultural or urban land, or landfill and excess sedimentation is a major destructive driver in forested wetlands. Many marshes are threatened by physical drainage, infilling and conversion to agricultural or urban land, even in some iconic wetlands such as the Doñana National Park and World Heritage site in Spain (Zorrilla-Miras et al. 2014). Freshwater peat wetlands are being converted to agriculture, both in temperate regions and in the tropics (Urák et al. 2017), with commodities like oil palm causing particular pressures (Koh et al. 2011). This may destroy the peatland directly, or indirectly through drainage, infilling or inundation, or excessive fire frequency and intensity (Turetsky et al. 2015). A study in peninsular Malaysia, Sumatra and Kalimantan showed that the proportion of peatland area covered by peat swamp forest decreased from 76% in 1990 to 41% in 2007 and 29% in 2015 (Miettinen et al. 2016).

Coastal wetlands are also being converted on a large scale. Drainage of tidal flats, salt marshes and lagoons, or excessive bar opening in barrier estuaries, can impact on ecological character, while in many cases land reclamation destroys or severely degrades the ecosystem (Murray et al. 2015). Conversion for agriculture or aquaculture is the primary driver of mangrove loss (Thomas et al. 2017), particularly in Southeast Asia (Richards & Friess 2016).

Direct drivers of wetland change

Table 3.1 presents a systematic analysis of the direct causes of anthropogenic change in wetlands, with an assessment of their significance (global, regional or more site-specific), divided up as in the main text of the Global Wetland Outlook, for all of the main wetland types according to Ramsar classification. It identifies drivers known to cause substantial changes in ecological character or destruction of wetlands. This rating is qualitative and based on expert knowledge, indicating drivers known across a wide range of contexts and locations. The importance of drivers will vary depending on individual contexts or for sites with special local characteristics.

Table 3.1
Anthropogenic direct drivers of change in different natural wetland types.

Drivers for each wetland type
- Major drivers of change of global distribution/ significance
- Significant drivers of change of regional to global distribution/ significance
- Other known significant drivers of change, extent local or unknown
- O Drivers that are known to cause wetland destruction.

		Physical regime					Extraction			Introduction				Structural modification		
		Water quantity	Water frequency	Sediment	Salinity	Thermal	Water	Biota	Soil and peat	Nutrients	Chemicals	Invasive species	Solid waste	Drainage	Conversion	Burning
Inland	Rivers, streams, floodplains	Major (O)	Major	Major	Other	Other	Major (O)	Other	Other	Significant	Significant	Significant	Other	Other	Major (O)	
Inland	Lakes	Major (O)	Other	Significant		Other	Major (O)	Significant	Significant	Significant	Other	Significant	Other		Other	
Inland	Forested wetlands	Major (O)	Major (O)	Significant	Other		Major (O)	Major (O)	Other	Significant	Other	Other	Other	Major (O)	Major (O)	Significant (O)
Inland	Peatlands	Major	Other			Major	Major (O)	Other	Major (O)	Significant	Other	Other	Other	Major (O)	Major (O)	Major (O)
Inland	Marshes (on mineral soils)	Major (O)	Significant		Other		Major (O)	Other	Other	Other	Other	Other	Other	Major (O)	Major (O)	Other
Inland	Underground wetlands	Major	Other	Other			Major (O)	Other		Other	Other		Other		Other	
Coastal	Estuaries, tidal flats, saltmarshes, lagoons	Major (O)	Other	Major	Significant	Other	Other	Significant		Major	Major	Other	Significant	Major	Major (O)	
Coastal	Mangroves	Major (O)	Significant	Significant	Significant		Other	Major (O)	Other	Significant	Significant	Other	Other		Major (O)	
Coastal	Reef systems (incl. coral; shellfish & temperate)			Major (O)		Major (O)		Significant		Significant	Other	Other (O)	Other			
Coastal	Sand dunes, rocky shores, beaches	Other	Other	Major (O)				Other	Other			Other	Other		Major (O)	
Coastal	Shallow marine waters, seagrass beds, kelp forests	Other	Other	Significant	Significant (O)	Other		Other	Other	Significant (O)	Other	Significant (O)	Other			

Indirect drivers influence wetlands through their effects on direct drivers

We consider *water-energy*; *food and fibre*; *infrastructure*; and *tourism*. These are interconnected and influenced by *climate change* and *governance*. They are strongly related to markets, value chains, overall social conditions and the environmental awareness of stakeholders.

The **water-energy** sector creates dams, reservoirs, dykes and infrastructure for water storage, flood prevention, hydropower and irrigation. Agriculture is by far the biggest user, followed by hydropower, manufacturing and domestic use. Biofuels and hydropower are increasingly challenged as climate-friendly energy partly due to their water use (Delucchi 2010).

The **food and fibre** sector influences wetlands through agricultural policies, market demand and land use changes. In Asia, increased production comes from intensification and higher agrochemical use (Figure 3.4); South American growth relies more on mechanization; while in Africa, growth is mainly from areal expansion, often impacting wetlands (OECD/FAO 2016). Aquaculture changes the physical regime and introduces nutrients, chemicals and invasive species, but impacts depend on the system used (e.g., pond culture or floating cages) (FAO 2016b).

Infrastructure includes buildings, pipelines, bridges, roads, factories, mines, dykes and airports. Urban areas block the movement of water, nutrients and animals. Mining damages river structure, increases sedimentation and releases pollutants including cyanide and mercury in gold mining. An estimated kilogram of mercury is released for every kilogram of gold from the Amazon (Ouboter et al. 2012). Roads fragment wetlands, impacting habitat, migration and species (Trombulak & Frissell 2000). Road traffic pollution includes fuel and lubricants and, in colder climates, road salt and de-icing fluids (Herbert et al. 2015). Traffic creates noise, light disturbance and roadkill. Roads literally pave the way for invasive species, hunting and fishing.

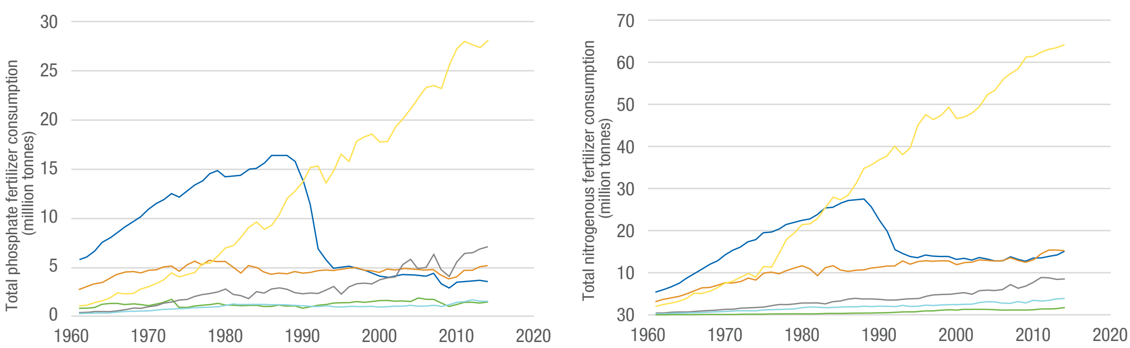


Figure 3.4
Trends in mineral fertilizer (nitrogen and phosphorus) use from 1961 to 2014. Figure based on combined data on agricultural inputs (Fertilizers 2002-2014 and Fertilizers Archive 1961-2001) from FAOSTAT (http://www.fao.org/faostat/en/#data).

Indirect drivers of wetland change

The **tourism and recreation** sector creates infrastructure (e.g., hotels, golf courses), and increases human pressure on wetlands, including resource use, waste and disturbance. Marine light pollution is increasing, with almost a quarter (22.2%) of global coastline exposed to nightly artificial light (Davies et al. 2014). Tourism also increases the number of non-native species (Anderson et al. 2015).

Climate change influences water volumes, flows, temperature, invasive species, nutrient balance and fire regimes (Finlayson 2017). Climate change also influences decision making, for example being used as justification for dam construction for hydropower.

Governance is a key component of successful wetland management. It should be flexible, transparent, inclusive and accountable, addressing power relations and equity (Mauerhofer et al. 2015). It requires learning, incorporation of new knowledge, formal and informal collaboration, assessment and adaptation (Mostert et al. 2007). Good governance is a strong predictor of successful wetland conservation (Amano et al. 2018), while weak governance leads to short-term decisions, neglects interests of minority groups or undermines conservation (e.g., Adaman et al. 2009).

Table 3.2 shows, based on expert opinion, the relationships between indirect drivers and the direct drivers of change in natural wetlands that were presented in Table 3.1.

Table 3.2
Indirect drivers of change and their influence on direct drivers of change in natural wetlands

Drivers for each wetland type
- Major influence of global distribution/ significance
- Significant influence of regional to global distribution/ significance
- Other known significant influence

			Food and fibre				Infrastructure				
		Water-energy infrastructure	Agriculture	Forestry	Aquaculture	Fisheries	Industry & mining	Transport (road, air, water)	Construction	Tourism & Recreation	Localized climate change impacts
Physical regime	Salinity	Significant	Significant		Other		Other	Other	Other		Significant
	Water quantity	Major	Major	Major	Significant		Significant	Significant	Other	Significant	Major
	Water frequency	Major	Significant	Significant	Significant		Other	Other		Other	Major
	Sediment	Major	Major	Significant	Significant		Significant	Significant	Significant	Other	Significant
	Thermal	Significant					Significant	Significant			Major
Extraction	Water	Major	Major	Significant	Significant		Major	Other	Significant	Significant	
	Soil & peat		Significant		Other		Significant		Significant		
	Biota	Other	Major	Significant		Major	Other	Significant		Other	
Introduction	Nutrients	Other	Major	Other	Major		Other	Other	Major	Significant	Significant
	Chemicals		Major	Other	Significant	Other	Major	Significant	Major	Significant	
	Invasive species	Other	Other	Significant	Major	Significant		Major	Significant	Other	Significant
	Solid waste		Significant		Other	Significant	Significant	Significant	Major	Major	
Structural change	Drainage	Significant	Major	Major			Other	Significant	Significant	Other	
	Conversion		Major	Major	Major		Major	Major	Major	Significant	
	Burning		Significant	Significant							Major

Global megatrends impact both direct and indirect drivers of change

Global megatrends are indirect drivers that influence all policy sectors and areas of human activity on a global scale (EEA 2015; Hajkowicz et al. 2012; Naisbitt 1982). Although seemingly far removed from the direct drivers of change, they influence wetlands through the decision making and human behaviour that they prompt.

Demography and population growth drive many decisions in food production and infrastructure development. Global population is expected to reach 10 billion by the mid-21st century (UN 2015b), with the strongest growth in developing countries. In the developed world, population will grow more slowly, or even shrink. In the short term, lack of economic development coupled with environmental degradation, climate-change and sometimes conflict, can lead to migration to developed countries (OECD 2015b).

Globalization influences most other megatrends and several indirect drivers of wetland change. In economic terms, globalization refers to the integration of national economies into international trade and financial flows (IMF 2002). However, it also has cultural and political aspects. Modern transport and telecommunications have increased flows of people, goods and knowledge across the globe. People travel for business or tourism, or become economic migrants. Food and goods are produced in areas with low production costs and shipped to consumers far away. Globalization can have benefits (economic development, poverty reduction) but risks increasing environmental pressures on wetlands. Opposition to global trade agreements has risen, with more protectionist policies now visible, while awareness about inequality in wealth is also on the rise (Islam 2015).

Changing consumption patterns are the result of population growth, globalization and economic development and ultimately affect wetlands. A growing middle class in developing countries is changing patterns of food and energy use (Hubacek et al. 2007; OECD/FAO 2016), increasing demand for infrastructure, industrial products and water and also increasing waste production and greenhouse gas emissions. For example, meat consumption has dramatic impacts on resource demands – including land use change to produce pasture and soy for feed – and boosts water use. Production of beef, poultry and pork all demand more resources than plant-based foods (UNCCD 2017).

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Urbanization creates pressures on wetlands, especially in coastal zones and river deltas. By 2050, two-thirds of the world population is expected to live in urban areas (UN 2015a). In the developing world, the urban population will likely double, due to economic opportunities in cities, agricultural mechanization reducing rural employment, and environmental degradation undermining rural livelihoods (EEA 2015). While urbanization offers potential for efficient resource use, rapid urban growth often brings poorly regulated development in the peri-urban fringe, with damaging social and environmental impacts (McInnes 2013). Urbanization alters wetlands through changes in hydrological connectivity, habitat alteration, water tables and soil saturation, pollution and ultimately species richness and abundance (Faulkner 2004).

Climate change. The Intergovernmental Panel on Climate Change projected climate change to significantly reduce surface water and groundwater resources in dry subtropical regions, intensifying competition for water; increasing extinction risk in freshwater species, especially due to synergistic effects with other drivers; posing a high risk of abrupt and irreversible regional-scale change in the composition, structure, and function of freshwater ecosystems; and damaging coastal ecosystems through sea level rise (IPCC 2014; Moomaw et al. 2018). Responses can be both negative and positive for wetlands. Increased hydropower and biofuels may cause wetland loss while the role of wetlands in carbon sequestration can promote conservation and restoration (Moomaw et al. 2018).

Environmental awareness and the importance of wetlands. Although the importance of ecosystem management has long been embedded in many traditional cultures, formal environmental policies and legislation started developing in the 19th century in response to environmental problems of industrialization (e.g., air pollution from coal burning in the UK; Brimblecombe 2011). The realization that in the industrialized era human well-being still depends on ecosystems resulted in concepts like the “ecosystem approach” (Smith & Maltby 2003) and “wise use” (Finlayson et al. 2011; Ramsar Convention 2005). During the last 30 years, general acceptance of wetland ecosystem services and their multiple values has developed. However, full integration of wetland values into economic policy and decision-making remains challenging (Finlayson et al. 2018), highlighting the need for continued efforts to educate decision-makers and civil society (Gevers et al. 2016).

Assessing the drivers of wetland degradation and loss

While the qualitative assessment of drivers of wetland degradation and loss in Tables 3.1 and 3.2 is valuable, more quantitative data on wetland drivers are needed for policy and decision making. Remote sensing or modelling data can also be used for integrated assessment and measurement of a typology of drivers (e.g., Tessler et al. 2016) and enable this to be applied to wetlands, as outlined in MacKay et al. (2009).

Perhaps the best quantitative estimates of drivers of change are made as part of modelling efforts, especially catchment-scale and global hydrology models (van Beek et al. 2011; Wisser et al. 2010), models to estimate nutrient exports from rivers (Mayorga et al. 2010), and global models to study aquatic biodiversity (Janse et al. 2015). These models calculate various direct drivers of wetland change such as river discharge and sediment and nutrient loads. They are often integrated within larger modelling frameworks that simulate indirect drivers of change such as climate, population and policy scenarios; as such they can be used to optimize sustainable use in wetlands (Sabo et al. 2017). Model predictions and the impact of modelling on determining trade-offs and decision making would generally benefit from improved monitoring and processing of data on wetland drivers.