

# The Second Warning to Humanity – Providing a Context for Wetland Management and Policy

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## Abstract

The Second Warning to Humanity provides a clarion call for wetland researchers and practitioners given the loss and degradation of wetlands, the declining availability of fresh water, and the likely consequences of climate change. A coordinated response and approach to policies has the potential to prevent further degradation and support resilient wetlands that can provide a range of ecosystem services, including buffering wetlands from climate impacts, and avoiding major climate amplification from temperature-induced release of additional carbon dioxide and methane while addressing the causes and consequences of global climate change. The Warning to Humanity also provides an opportunity for organisations such as the Society of Wetland Scientists to raise the profile of wetlands and to initiate a discussion on how to respond and change direction from the destructive development trajectory that led to wetland loss and degradation. It also provides a signal for a reappraisal of the effectiveness of the implementation of the Ramsar Convention on Wetlands as an international mechanism for ensuring the sustainability of wetlands.

**Keywords** Climate change · Ramsar convention · Wetlands · Second warning to humanity

## Introduction

World scientists recently released a “Second Warning to Humanity” (Ripple et al. 2017) based on the manifesto issued 25 years ago by the Union of Concerned Scientists (1992).

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The manifesto cautioned humankind about the need to curtail environmental destruction, as we are on a collision course with nature. In releasing the Second Warning, the authors expressed concern about environmental damage, including the declining availability of fresh water, and the likely consequences of climate change for biodiversity. The Second Warning to Humanity was published with the endorsement of 15,364 signatories. Since publication, more than 5100 additional signatories have added their endorsement (<http://scientistswarning.forestry.oregonstate.edu/>; accessed 12 June 2018).

In expressing their concerns, Ripple et al. (2017) were aware that they were reiterating sentiments and messages that have appeared in the literature over the past 4–5 decades. Similar sentiments underpinned the effort throughout the 1960s that led to the establishment of the global wetlands treaty, the Ramsar Convention on Wetlands, in 1971. The impetus for the Convention came from concerns about the ongoing loss and degradation of wetlands and committed signatory governments to maintain the ecological character of internationally important wetlands and to stem the loss of wetlands globally (Matthews 1993; Davidson 2018). Given that the rate of wetland loss and degradation has not abated

(Davidson 2014; Dixon et al. 2016), it is arguable whether the Convention has been a success or not, although Finlayson et al. (2011) indicated that the loss and degradation may have been greater but for the efforts of the Convention.

While the Second Warning to Humanity was directed not only at wetlands, it can be considered a clarion call to reinvigorate global efforts to halt and reverse the ongoing loss and degradation of wetlands. Unlike some of the earlier calls to conserve wetlands, the Second Warning includes the need to curb greenhouse gas emissions, phase out fossil fuels and begin reducing atmospheric greenhouse gas concentrations in order to mitigate climate change. The relevance of the Second Warning to wetland conservation and management was introduced by Finlayson et al. (2017a) and is expanded in this short communication and ends with suggestions about the roles that scientific societies, including the Society of Wetland Scientists (SWS), can play in responding to the warnings.

## Climate Change and Wetlands

Moomaw et al. (2018) have provided a comprehensive review of the consequences of climate change for wetlands, including those underlain by permafrost. They examined the important role that wetlands play in removing carbon dioxide from the atmosphere and sequestering carbon in wetland soils over long time periods, and the important climate adaptation and resilience services that wetlands provide. They then identified and described a number of wetland policies with implications for addressing climate change and concluded by describing how wetland practitioners and others can manage and conserve wetlands to address climate change. At the same time, they emphasize that wetlands are particularly vulnerable to changes in climate. They then consider how climate considerations can be incorporated into wetland policy and management, which is critical given the role that wetlands play in carbon storage. The role that wetland management might play in the future trajectory of climate change on the global scale has often been overlooked by the scientific community and policy makers. Even though wetland emissions and removal of greenhouse gases are mentioned in the latest IPCC report, AR5, they are not included in global carbon accounting.

In particular, the review notes that wetlands underlain by permafrost are of increasing concern, as they are vulnerable to climate amplification from temperature-induced release of additional carbon dioxide and methane as they thaw. Once this positive feedback begins, it will be difficult if not impossible to control, making it far more challenging to halt the accelerating emissions of greenhouse gases. On the other hand, restoring fresh and saltwater wetlands that have been degraded can increase the sequestration rate of carbon dioxide, and these wetlands can then become carbon sinks far

into the future. Creating new freshwater wetlands unfortunately may initially produce more greenhouse gases than are sequestered until a cross over point is reached when they store more carbon each year than they release. Alternatively, newly created saltwater wetlands rapidly become net carbon sinks due to differing biogeochemical processes.

The authors recommend that the scientific community must clearly communicate to policy makers and managers the significance of wetlands for the wellbeing of society and the economy. Communicating with policy makers, managers and the public requires an alignment of wetland science and specific aspects of climate mitigation and resilience with the concerns and mindset of the public. The authors also draw on research that documents the high proportion of climate scientists who agree that anthropogenic climate change is occurring, an observation that should encourage broad public agreement to support action. In addition, it is essential to make sure that the science behind the consensus is clearly presented and understood.

## Halting Wetland Loss

The case for preventing further wetland loss and degradation has been made for decades. The signing of the Ramsar Convention on Wetlands signalled the development of a global commitment for maintaining the ecological character of all wetlands. However, the Millennium Ecosystem Assessment (2005) and more recent analyses (Finlayson 2012; Gardner et al. 2015) have shown that this commitment has not been fulfilled. The reasons are many and complex, including the perception that conserving wetlands conflicts with efforts to improve the immediate, short-term personal and economic wellbeing of people. Given that the Convention has existed for more than four decades, the failure to generate major public and government support signals that an alternative approach is needed. Finlayson (2012) points not to the specific policies or decisions promulgated by the Convention, but to the inability of national governments to respond and deliver the required results in-country and on-ground. The Second Warning to Humanity includes this element within the following comment:

We have learned much since 1992, but the advancement of urgently needed changes in environmental policy, human behavior, and global inequities is still far from sufficient. (Ripple et al. 2017).

Neither the consequences of human-induced climate change on wetlands, nor the role that wetlands play in providing climate mitigation and adaptation services was foreseen when the Ramsar Convention entered into force. Despite

being able to call on the considerable scientific and policy-relevant information provided by the IPCC (such as that from Gitay et al. 2002, Bates et al. 2008) and others (e.g. Finlayson et al. 2006; Junk et al. 2013) that wetlands were vulnerable to climate change, the Convention has not developed guidance for managing wetlands under climate change (Finlayson et al. 2017b) other than suggesting approaches for assessing vulnerability (Gitay et al. 2011). Given this situation, we encourage wetland scientists to further engage with national policy makers and seek greater cooperation between those dealing with wetlands and with climate change to help ensure the sustainability of wetlands globally. This could include a greater emphasis on i) the potential of wetland restoration to help mitigate climate change, and ii) the identification and adoption of adaptation measures, and the avoidance of maladaptation, to ensure wetlands are not adversely impacted by climate change.

Despite the failure to address climate change, the Ramsar Convention has successfully addressed other complex and multi-sectoral issues and has reached out to other sectors that influence decisions about wetlands. It has, for example, provided technical and policy guidance for wetland restoration (Alexander and McInnes 2012), for managing wetlands within the context of human health and wellbeing (Horwitz et al. 2012), and for recognising and valuing the importance of ecosystem services (De Groot et al. 2006), all of which have multi-sectoral elements and implications for responding to climate change. The multi-sectoral responses that have occurred through the aegis of the Convention provide a platform for addressing serious threats to the ecological quality of wetlands. Climate change is another critical threat and is interconnected with the many existing threats that adversely affect wetlands that have been addressed through the Convention.

## Responding to the Second Warning to Humanity

In addition to actions and responses by governmental and non-governmental organisations, the Second Warning to Humanity identifies a suite of issues where the general scientific community could respond, principally by providing and exchanging scientific knowledge to foster the conservation and understanding of the importance of wetlands. SWS is an independent association of wetland scientists and practitioners that has as its mission the promotion of "...understanding, conservation, protection, restoration, science-based management, and sustainability of wetlands" (<http://sws.org/About-SWS/overview.html>; accessed 11 March 2018). The mission is supported by activities to encourage the use of sound science in wetland policy and stewardship and by advocacy

to establish wetland science as a foundation for wetland management and policy. The mission of SWS is closely related to many of the responses needed to address the issues raised in the Second Warning for Humanity.

With this mission in mind, the following clauses from the Second Warning for Humanity provide a basis for how a scientific society such as SWS could respond to the clarion call with a particular emphasis on wetlands.

As most political leaders respond to pressure, scientists, media influencers, and lay citizens must insist that their governments take immediate action as a moral imperative to current and future generations of human and other life. With a groundswell of organized grassroots efforts, dogged opposition can be overcome and political leaders compelled to do the right thing.

Sustainability transitions come about in diverse ways, and all require civil-society pressure and evidence-based advocacy, political leadership, and a solid understanding of policy.

The SWS's 2015–20 strategic plan has operational goals (<http://sws.org/category/governance.html>; accessed 11 March 2018) that provide a means to respond to the Second Warning. In particular, the Second Warning to Humanity identifies the imperative to inform the development of appropriate policy responses at national and international levels to ensure the ongoing sustainable use and restoration of wetlands. Organisations such as SWS, with an international membership of wetland researchers and practitioners, are well placed to make it clear that work on a specific local wetland is important because the state of that wetland is part of the global response that addresses climate change.

The Second Warning to Humanity is an opportunity for SWS and other organisations to raise the specific profile of wetlands by raising awareness of their importance and condition globally and to initiate a discussion on how to respond to the challenge of changing direction from the current destructive development trajectory the world is on. Wetland researchers and practitioners need to gain the attention of policy makers, including those from the wider sectors that influence the future of wetlands, to make clear the critical role of wetlands in meeting near and mid-term climate goals such as the 1.5/2.0 °C temperature rise limitation, and longer-term biosphere needs for our sustainable future (Moomaw et al. 2018). The larger goal of such efforts is to elevate wetlands in international considerations of climate change.

Members of the SWS have previously shown their interest in responding to the scientific warnings concerning challenges in wetlands practice and policy, demonstrated when over 200 delegates at the SWS 2017 Annual Meeting signed the Society's San Juan Statement on Climate Change and

Wetlands (Table 1). The Society has also formed a Public Policy and Regulation Section to provide comments in concert with partner societies and influence public debates that are needed to respond to the types of issues raised in the Second Warning for Humanity. It is recognized that such efforts need to extend beyond ‘talking to the converted’ and include those in other sectors who can influence policy and actions that impact wetlands.

While signing the SWS San Juan Statement may not be seen as a profound action it does show that scientists are aware of the importance of wetlands for maintaining a supportive climate and the importance of making the best use of international policy mechanisms. It can be seen as one of the many steps noted in the Second Warning to initiate change in policy and environmental outcomes through discourse and the sharing of information. As such, the SWS San Juan Statement contributes to the “...civil-society pressure and evidence-based advocacy, political leadership, and a solid understanding of policy.” (Ripple et al. 2017) that is needed to influence policy makers and sway public opinion. The importance of influencing policy makers who may not be fully aware of the importance of wetlands cannot be under-estimated.

The sentiment expressed in the SWS San Juan Statement can be extended to encourage all wetland managers and our broader society to embrace the Second Warning to Humanity and take further actions to ensure that wetlands and their relationship to climate change are recognised and included in relevant international, national and local policy and practice for wetland and climate sustainability (Moomaw et al. 2018). These actions to protect and restore wetlands are also implicit in a number of the Sustainable Development Goals. The diverse and effective steps provided in the Second Warning by Ripple et al. (2017) to transition to a sustainable path to the

future were rephrased in Finlayson et al. (2017a) to apply specifically to wetlands, and with some adjustments are presented below:

- a) prioritizing the enactment of connected, well-funded and well-managed networks of protected areas for a significant proportion of the world’s wetland habitats;
- b) maintaining and re-establishing wetland ecosystem services by halting the conversion of wetlands to other land uses;
- c) restoring wetland plant communities at large scales;
- d) rewilding wetlands with native species, including apex predators, to restore ecological processes and dynamics;
- e) developing and adopting adequate policy instruments to reverse the loss of wetland animals, over-fishing and poaching, and the exploitation and trade of threatened species;
- f) reducing, through education and better infrastructure, the wastage of wetland-derived food;
- g) promoting dietary shifts to reduce the extent of over-grazing by cattle on wetlands;
- h) increasing outdoor wetland education for children and adults, as well as the involvement of wider society, including local and indigenous communities, in the management of wetlands;
- i) encouraging positive environmental change in wetlands by supporting ecologically-sound financial investments and divesting from ecologically-destructive investments;
- j) devising and promoting green technologies and adopting renewable energy sources that do not adversely impact wetlands; and
- k) shifting our economy to reduce wealth inequality and ensure that prices, taxation, and incentive systems take into account the real costs which consumption patterns impose on wetlands.

While these steps are not specifically directed at responding to climate change adaptation or mitigation, they are interconnected given the complexity of managing wetlands and ensuring their sustainability. Recognising this interconnectedness has been one of the features of wetland management in recent years.

The issuing of the Second Warning to Humanity also provides a signal for a reappraisal of the effectiveness of the responses over the past decades to the basic premises that underpinned the development of the Ramsar Convention on Wetlands. Have these been realised and what else can be done to ensure the sustainability of these ecosystems under further pressure, such as that expected under global climate change? Answering these questions will also contribute to the many steps being planned to address the importance of wetlands for delivering the United Nations Sustainable Development Goals

**Table 1** Society of Wetland Scientists San Juan Statement (Finlayson et al. 2017b). The signatories were presented on a second panel and recorded with the Statement

#### SOCIETY OF WETLAND SCIENTISTS SAN JUAN STATEMENT ON CLIMATE CHANGE AND WETLANDS

The following participants at the Society of Wetland Scientists 2017 Annual Meeting encourage(s) policy makers in all countries to continue their collaborative efforts to develop and implement international policies, such as the Paris Climate Agreement, to mitigate global climate change and, in so doing:

- Ensure the protection of existing carbon banks in wetlands and encourage carbon sequestration;
- Maintain or restore wetlands for their biodiversity and ecosystem services, including climate resiliency;
- Request all wetland managers and scientists to share this statement and support local to global efforts to combat climate change for the betterment of humankind.

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and ensuring the lasting protection of our remaining wetlands with multiple benefits for humanity. In a rejoinder to several responses to the issuing of the Second Warning Ripple et al. (2018) emphasise the importance of using evidence-based reasoning to create healthy links between people and the biosphere. In this article we extend the responses to include a greater effort by wetland practitioners and scientists to engage more effectively with wider society and encourage policy makers to enact decisions that prevent further wetland loss and degradation and encourage even more wetland restoration. As a part of this it is important to consider the knowledge and input of local and indigenous communities who generally have a closer association with wetlands than many other members of our societies.

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