

The Denver Declaration on the Management and Restoration of Wetlands

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ABSTRACT

Following the release of the San Juan Statement on Climate Change and Wetlands by the Society of Wetland Scientists in 2017 the *Denver Declaration on the Management and Restoration of Wetlands* was produced and signed by approximately 200 delegates at the 2018 annual meeting of the Society. The Declaration recognised the importance of wetlands and their significance as carbon sinks and the opportunities to sequester additional quantities of carbon. It further highlighted the need to maintain and restore wetlands, including those in mountain regions, for their biodiversity and ecosystem services, including climate resiliency. The Declaration was supported by a special symposium on *Wetlands in a Changing Climate: Science, Policy and Management*. These activities were placed within the context provided by the *World Scientists' Warning to Humanity: A Second Notice* and by the *Global Wetlands Outlook* produced by the Ramsar Convention on Wetlands.

INTRODUCTION

In 2017 approximately 200 individual attendees at the Society of Wetland Scientists' (SWS) 38th annual meeting (conference) in San Juan, Puerto Rico, signed the San Juan Statement on Climate Change and Wetlands. The statement focussed on encouraging "policy makers in all countries to continue collaborative efforts to develop and implement international policies, such as the Paris Climate Agreement, to mitigate global climate change" (Finlayson et al. 2017a). It also represented an active step by the SWS to encourage members to address the alarming state and trends for wetlands globally (Ramsar Convention 2018), as called for in an article on the Second Warning to Humanity and Wetlands (Finlayson et al. 2018). The later was developed by the same team of authors that had prepared an overview of scientific, policy and management issues associated with wetlands in a changing climate (Moomaw et al. 2018) and represented concern over the fate of wetlands globally under global change.

In line with these activities and to maintain momentum for engaging with the wetland researchers and practitioners that attend SWS annual conferences a further statement was issued by attendees at the 39th conference in Denver, Colorado, USA in June 2018. This was presented as the *Denver Declaration on the Management and Restoration of Wetlands* and was supported by a special interest symposium on *Wetlands in a Changing Climate: Science, Policy and Management* within the conference.

The Denver Declaration is presented below along with a summary of the special symposium held during the conference.

THE DENVER DECLARATION

The Denver Declaration (Figure 1) was signed by approximately 200 delegates to indicate their support for the collaborative efforts that were encouraged in the San Juan Statement to develop and implement international policies to mitigate global climate change as well as to stress the importance of wetlands for their biodiversity and ecosystem services, including as carbon sinks.

The Denver conference was located at the foot of the Rocky Mountains, which is an inspiring place for the discussion of future carbon conservation. Field trips enabled delegates to investigate riparian wetlands on the high plains at approximately 1,600 meters above sea level, all the way up to high-altitude peatland fens at approximately 3,050 meters. The delegates recognized the immense ecological, economic, cultural, and spiritual significance of high-altitude wetlands and the key roles they play in the hydrology and ecology of major rivers on continents around the world.

As with the San Juan Statement, the Denver Declaration also requested all wetland managers and scientists to share the statement and to encourage policy makers to support local to global efforts to combat the loss of all wetlands for the betterment of humankind.

As outlined in the paper about the Second Warning to Humanity and Wetlands (Finlayson et al. 2018), signing such a Declaration at a conference may not in itself be a profound action, but it does demonstrate that the signatories "are aware of the importance of wetlands for maintaining a supportive climate and the importance of making the best use of international policy mechanisms."

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It can also be seen as one of the many steps identified in the World Scientists' Warning to Humanity <http://scien-tistswarning.forestry.oregonstate.edu/> that can be taken to initiate changes in policy and environmental outcomes through discourse and the sharing of information (Ripple et al. 2017).

The importance of influencing policy makers who may not be fully aware of the importance of wetlands for mitigating climate change cannot be under-estimated, especial-

ly given existing discrepancies in the international policy platforms for wetlands when it comes to climate change (Finlayson et al 2017b; Moomaw et al. 2018).

SYMPOSIUM ON WETLANDS IN A CHANGING CLIMATE: SCIENCE, POLICY AND MANAGEMENT

The symposium was arranged at the SWS 2018 Denver conference to enable the presentation of recent research that had been published in Moomaw et al. (2018), including a synthesis of recent research on the status and climate vul-

FIGURE 1. The Denver Declaration on the Management and Restoration of Wetlands.

The following participants at the Society of Wetland Scientists 2018 Annual Meeting affirm their support for the “San Juan Statement on Climate Change and Wetlands” that was signed by more than 200 participants at the Society’s 2017 Annual Meeting.

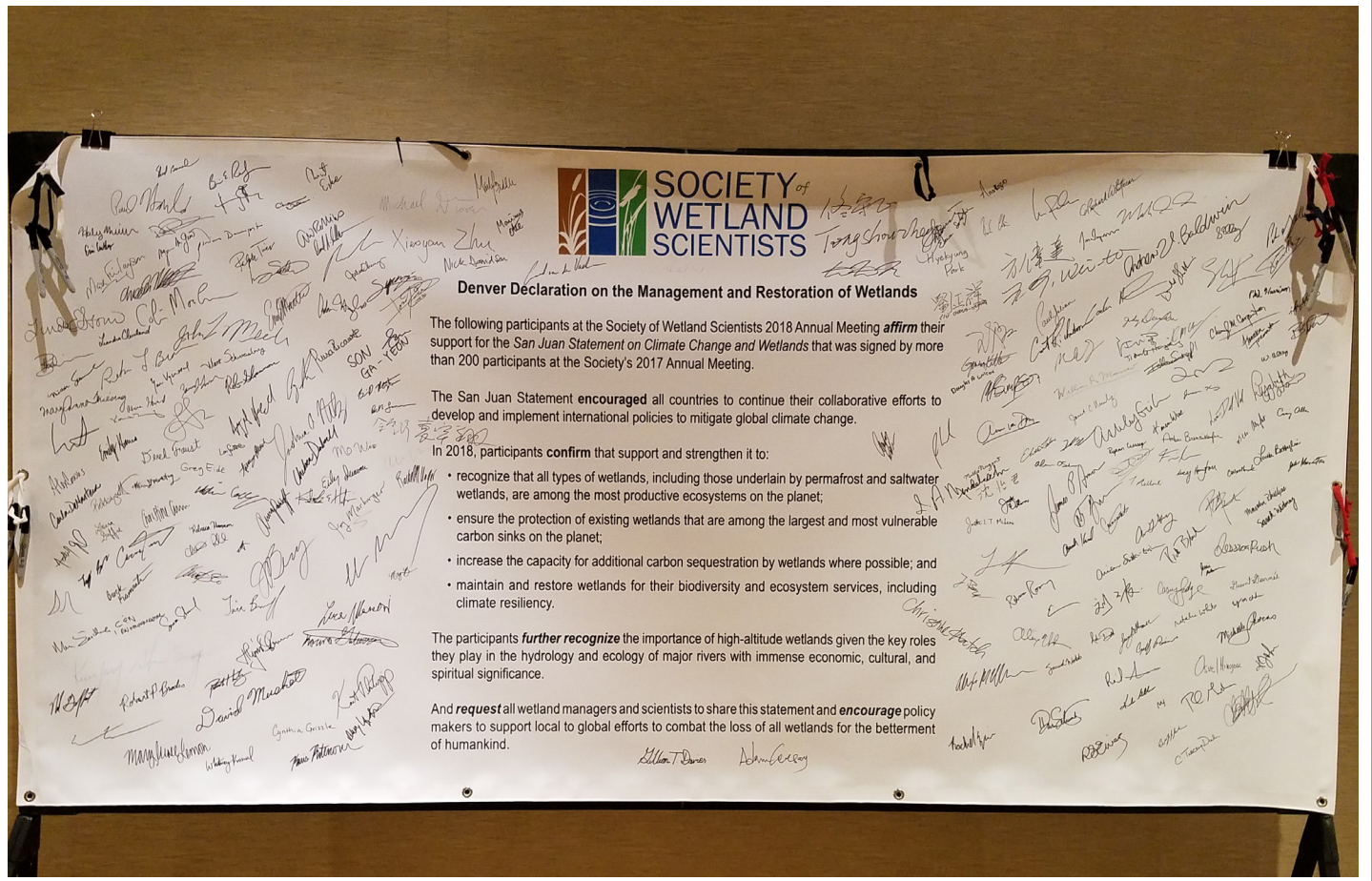
The San Juan Statement encouraged all countries to continue their collaborative efforts to develop and implement international policies to mitigate global climate change.

In 2018, participants stress the importance of:

- i) recognizing that all types of wetlands, including those underlain by permafrost and coastal wetlands, are among the most productive ecosystems on the planet;
- ii) ensuring the protection of existing wetlands that are among the largest and most vulnerable carbon sinks on the planet;
- iii) increasing the capacity for additional carbon sequestration by wetlands where possible; and
- iv) maintaining and restoring wetlands for their biodiversity and ecosystem services, including climate resiliency.

The participants also recognize the immense ecological, economic, cultural, and spiritual significance of high-altitude wetlands and the key roles they play in the hydrology and ecology of major rivers.

And request all wetland managers and scientists to share this statement and encourage policy makers to support local to global efforts to combat the loss of all wetlands for the betterment of humankind.



nerability of freshwater and saltwater wetlands, and their contributions to addressing climate change (carbon cycle, adaptation, and resilience). It further explored the policy and management realm for wetlands from international to national, subnational and local levels to identify strategies and policies reflecting an integrated understanding of both wetland and climate change science.

Based on information presented in Moomaw et al. (2018), the symposium highlighted:

- Wetlands as a major carbon reservoir recognizing that peatlands sequester approximately as much carbon as global forest biomass, and along with vegetated coastal ecosystems are among the most carbon rich on the planet;
- The importance of securing estimates of current wetland carbon storage and the future for carbon sequestration potential as temperatures warm and create emission feedback vulnerabilities from thawing and drying wetlands - especially permafrost - triggered by rising temperature and other disturbances;
- The case for preventing further loss of existing wetlands which is significant but is often not included in assessing limits on future emissions to

meet climate goals; and

- The intersection of climate and wetland policy and management from the international to national, subnational and local levels.

Specific recommendations were discussed that captured the synergies between wetlands and carbon cycle management, climate adaptation and resiliency to further enable researchers, policy makers and practitioners to protect wetland carbon and climate adaptation/resiliency ecosystem services as we move forward in a world with a changing climate. The talks that were presented are outlined in Table 1, and the associated abstracts are presented in the October 2018 issue of *Wetland Science & Practice* (Volume 35, No. 3; https://issuu.com/societyofwetlandscientists/docs/2018_special_issue).

The relevance of the Denver Declaration to the members of SWS and wider society is shown through the key messages presented in the Global Wetland Outlook (GWO) (Ramsar Convention 2018), launched at the 13th Conference of the Ramsar Convention on Wetlands in October 2018. The key messages in the Global Wetland Outlook, based on recently compiled data about changes in the ecological character of wetlands, provide poignant reading (see Figure 2). The Outlook also provided information on

TABLE 1: Summary of presentations included in the special symposium on Wetlands in a Changing Climate: Science, Policy and Management

Title	Author	Address
Future Opportunities to Incorporate Wetlands Science and Policy into Climate Solutions	William Moomaw	Center for International Environment and Resource Policy, The Fletcher School of Law and Diplomacy and Global Development and Environment Institute, Tufts University, Medford, MA, USA
Polar Wetlands of the Past and their Utility for Predicting the Future	Ben LePage	Pacific Gas and Electric Company, San Ramon, CA, USA and Academy of Natural Sciences, Philadelphia, PA, USA
Climate Change Impacts on Northern Wetlands and Feedbacks to Global Climate	Sue Natali	Woods Hole Research Center, Woods Hole, MA, USA
Coastal Wetlands and Climate Change: Threats, Opportunities, and Policy Recommendations	Ariana E. Sutton-Grier	MD/DC Chapter of The Nature Conservancy, Bethesda, MD, USA and Earth System Science Interdisciplinary Center, University of Maryland, College Park, MD, USA
Effects of Precipitation Extremes on Stressed Coastal Vegetation	Beth Middleton	USGS, Wetland & Aquatic Research Center, Lafayette, LA, USA
International Wetland and Climate Policy – The Huff, Puff and Bluff and Stormy Times Ahead?	C. Max Finlayson	Institute for Land, Water & Society, Charles Sturt University, Albury, New South Wales, Australia & IHE Delft, Delft, Netherlands
What’s a Practicing Wetland Scientist to Do? Policy and Management Tools, Strategies and BMPs in Light of Climate Change	Gillian T. Davies	BSC Group, Inc., Worcester, MA, USA and Global Development and Environment Institute, Tufts University, Medford, MA, USA
Restoring Coastal Wetlands: A Nature-based Solution to Cope with Sea Level Rise and Enhance Biodiversity. a Mediterranean Example	Patrick Grillas	Tour du Valat, Research Centre for the Conservation of Mediterranean Wetlands, Arles, France

FIGURE 2. Key messages from the Global Wetland Outlook (Ramsar Convention 2018)

Key Messages

Healthy, functioning natural wetlands are critical to human livelihoods and sustainable development.

Although still covering a global area almost as large as Greenland, wetlands are declining fast, with 35% losses since 1970, where data are available.

A quarter of wetland animal and plants species are at risk of extinction.

Quality of remaining wetlands is also suffering, due to drainage, pollution, invasive species, unsustainable use, disrupted flow regimes and climate change.

Wetland ecosystem services, ranging from food security to climate change mitigation, are enormous, far outweighing those of terrestrial ecosystems.

The Ramsar Convention promotes wetland conservation and wise use and is at the centre of efforts to halt and reverse wetland loss.

Key steps in conserving and regaining healthy wetlands include:

- Enhancing the network of Ramsar Sites and other wetland protected areas
- Integrating wetlands into planning and the implementation of the post-2015 development agenda
- Strengthening legal and policy arrangements to conserve all wetlands
- Implementing Ramsar guidance to achieve wise use
- Applying economic and financial incentives for communities and businesses
- Ensuring participation of all stakeholders in wetland management
- Improving national wetland inventories and tracking wetland extent.



the drivers of change as well as recommended responses based on the Convention's Strategic Plan. The Outlook is supported by a set of technical notes providing supporting information to each of its sections, namely: introduction to the report (Gardner et al. 2018a); status and trends of wetlands (Finlayson and Davidson 2018); drivers of change in wetlands (van Dam 2018); and responses from the *Ramsar Strategic Plan 2016-2020* (Gardner et al. 2018b).

So as to further bring the key messages from the SWS's recent work on wetlands and climate change to the attention of policy makers, in October 2018 at the Ramsar Convention's COP13, SWS organized a side-event during the COP on "Climate management, adaptation and key legal issues for Ramsar wetlands." The event was jointly organised by SWS, the Australian Department of Environment and Energy, Stetson University School of Law, and the Institute for Land Water & Society at Charles Sturt University. Presentations covered: the role of wetlands in climate change: consequences and solutions; the importance of coastal wetlands for "blue carbon"; and key legal issues in the COP13 draft Resolutions on climate change.

The SWS side-event was designed to inform and support Ramsar Contracting Parties' negotiations during COP13 on five climate change-related resolutions, as listed here.

- Guidance on identifying Wetlands of International Importance (Ramsar Sites) for global climate change regulation as an additional argument to existing Ramsar criteria;
- Restoration of degraded peatlands to mitigate and adapt to climate change and enhance biodiversity;
- Promote conservation, restoration and sustainable management of coastal blue carbon ecosystems;
- Recognize cultural values, indigenous peoples and local communities, and climate change mitigation and adaptation in wetlands; and
- Support sustainable urbanization, climate change and wetlands.

After negotiations and agreed changes all five were adopted by COP13. The final text of each of these Resolutions is available in the three languages (English, French and Spanish) of the Convention (<https://www.ramsar.org>).

CONCLUSION

Delegates at the 2018 annual meeting of the Society of Wetland Scientists recognized through the *Denver Declaration on the Management and Restoration of Wetlands* the immense ecological, economic, cultural, and spiritual significance of high-altitude wetlands and the key roles they play in the hydrology and ecology of major rivers on continents around the world. This included an emphasis on the opportunity for wetlands to sequester carbon to mitigate the impact of climate change on humanity. As with the San Juan Statement issued by the Society in 2017 the Denver Declaration also requested all wetland managers and scientists to share the statement and to encourage policy

makers to support local to global efforts to combat the loss of all wetlands for the betterment of humankind. A symposium on *Wetlands in a Changing Climate: Science, Policy and Management* further emphasized the role of wetlands in mitigating climate change and the need for adaptation, including restoration, to ensure that the biodiversity and ecosystem services, including climate resiliency, from wetlands were maintained and extended. ■

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