

# Ramsar Wetland Disease Manual

## Guidelines for Assessment, Monitoring and Management of Animal Disease in Wetlands





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**Cover photo:** Wildlife biologist undertaking waterbird disease surveillance at Dagona Sanctuary Lake (Ramsar Wetland of International Importance), Nigeria (*Ruth Cromie*).

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WILDLIFE AND ECOSYSTEM HEALTH

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# Foreword

Perhaps there are no better settings to illustrate the importance of a ‘One World, One Health’ approach than within wetlands. Well functioning wetlands provide the services, resources and means by which people, livestock and wildlife can remain healthy. The health of these sectors cannot be viewed independently as complex interactions and their interdependence means that the health of one affects the health of the others. Wise use of wetlands helps to promote health and this has been acknowledged by the substantial body of work conducted by the Ramsar Convention’s Secretariat and Scientific and Technical Review Panel (STRP) on Healthy Wetlands, Healthy People.

In 2005, the issue of highly pathogenic avian influenza brought specific animal diseases in wetlands to the attention of the Ramsar Convention and it was quick to address some of the problems relating to wetland and waterbird conservation at the 9th meeting of the Conference of the Contracting Parties (COP) to the Ramsar Convention later that same year. Resolution IX.23 provided a clear acknowledgement that disease control operations needed to remain within the context of wise use. At COP 9, this multifaceted global issue resulted in a request for guidance from Contracting Parties which was provided as a substantive Annex to Resolution X.21 in 2008 (latterly repackaged as Ramsar Handbook No. 4). Resolution X.21 instructed STRP to develop practical guidance on the prevention and control of other diseases of either domestic or wild animals in wetlands, especially those diseases that have implications for human health, and how such guidance can be best incorporated into management plans at Ramsar sites and other wetlands.

This Manual addresses that request and provides wetland managers and other wetland stakeholders with a better understanding of their key role in health management in wetlands.

**Anada Tiéga**

Secretary General  
Ramsar Convention on Wetlands

# Preface

When confronted by a disease outbreak in a wetland, a problem analysis almost always tracks back 'upstream' and finds an anthropocentric reason – land use, pollution, abstraction, livestock, introduced species, or such like. It becomes easy to see that decisions made about the management of a wetland hold the key to disease prevention and thus that the wetland managers are the holders of this key. They, together with the decision makers, are the ones who can make a difference to health in wetlands. But do these personnel have the understanding of how to do the right thing for disease prevention and control? And do they understand the importance of the complex interactions between humans, their livestock and wildlife when managing health in wetland ecosystems?

It was heartening to see the guidance on highly pathogenic avian influenza H5N1 being well received at the 10<sup>th</sup> Conference of the Contracting Parties (COP) to the Ramsar Convention in 2008 (Resolution X.21). The request for further guidance on animal diseases in wetlands came from the Tanzanian delegate speaking on behalf of the Africa Region. Coincidence or otherwise, it was a Tanzanian wildlife manager responsible for one of the planet's high profile protected areas who said, following a taught module on wildlife health, that he "hadn't thought about wildlife in that way before" and that he would "make practical changes and do things differently". To try to better understand the nature of guidance needed for wetland health management, we conducted a needs survey of wetland professionals - there was a clear desire for practical guidance.

Although designed for wetland managers, it was difficult to know just how to pitch this Manual given the enormous range of personnel responsible for managing wetlands across the world. We hope it is helpful and provides the wetland manager with some insight and a practical manual to help to "do things differently".





# Overview of this Manual

This Manual is intended to provide the reader with an overview of the principles and practicalities of managing animal diseases at wetland sites. The Manual highlights the importance of including disease prevention and control in wetland management plans and provides guidelines on how to do so. It should be used in conjunction with Ramsar Handbook No. 18 on *Managing Wetlands*<sup>1</sup>.

This Manual draws on a range of primary sources – interpreting and re-packaging the information for the wetland manager and the wetland policy maker. This Manual is not intended as in-depth technical guidance for dealing with specific disease issues, but as a primer describing the key components of disease prevention and control strategies and directing the reader to the primary sources, where more information can be obtained.

The Manual is divided into five chapters accompanied by this Overview and a selection of Appendices ► **Figure 0-1**.

► **Table 0-1** provides a summary of what you can expect to find in each chapter.



**Figure 0-1.**  
Structure of this manual.

<sup>1</sup> *Managing wetlands: Frameworks for managing Wetlands of International Importance and other wetland sites.* Ramsar handbooks for the wise use of wetlands, 4th edition, vol. 18. Ramsar Convention Secretariat, Gland, Switzerland.

**Table 0-1.** Summary of the contents of each chapter of this Manual

<b>1 Introduction</b>	<ul style="list-style-type: none"><li>▪ A <b>general introduction to animal diseases in wetlands</b> – what they are and why they are a growing problem.</li><li>▪ A <b>summary of the impacts of wetland disease</b> on biodiversity, livestock and human health and its economic implications.</li><li>▪ The <b>scope, aim and objectives</b> of this Manual.</li></ul>
<b>2 Principles of Disease Management in Wetlands</b>	<ul style="list-style-type: none"><li>▪ An <b>introduction to disease management in wetlands</b> – important concepts.</li><li>▪ A look at the <b>disease relationship</b> between wildlife, livestock and humans.</li><li>▪ An introduction to taking an <b>ecosystem approach to health</b>.</li><li>▪ Why disease should be an <b>integral to wetland management</b>.</li><li>▪ <b>Invasive alien species</b> and the parallels for disease control.</li><li>▪ A <b>summary of current strategies</b> for managing animal diseases in wetlands, including proactive strategies for preventing disease and reactive strategies for controlling disease.</li><li>▪ An introduction to the role of <b>communication, education, participation and awareness</b> in disease management.</li></ul>
<b>3 General Management Practices</b>	<ul style="list-style-type: none"><li>▪ A standardised procedure for completing a <b>disease risk assessment</b>.</li><li>▪ Guidance on <b>how to incorporate disease management into management plans</b> for wetlands.</li><li>▪ Guidance for <b>reducing the risk of emerging disease</b>.</li><li>▪ Guidance for <b>detecting, assessing and responding to disease outbreaks</b>.</li><li>▪ Guidance for <b>managing disease</b>.</li><li>▪ Guidance for <b>communication, education, participation and awareness</b>.</li><li>▪ <b>Case studies:</b> Descriptions and photos of wetland managers' experiences responding to disease problems.</li></ul>
<b>4 Animal Diseases Currently Causing Concern in Wetlands</b>	<ul style="list-style-type: none"><li>▪ A summary of some of the <b>animal diseases currently causing concern</b> in wetlands.</li><li>▪ <b>Key questions to ask when a disease is detected:</b> geographic extent, wetland characteristics, host range, seasonality, transmission, field signs and potential impacts.</li><li>▪ <b>Factsheets</b> on a selection of diseases currently impacting wetlands providing a brief description of the disease and the methods used for prevention and control.</li></ul>
<b>5 Where to go for Further Assistance and Advice</b>	<ul style="list-style-type: none"><li>▪ A list of key international and regional <b>contacts</b>.</li><li>▪ A <b>bibliography</b> of key resources providing information and guidance on disease management.</li></ul>

## Who should use this Manual

This Manual focuses on the information needs of:

- 1. Wetland managers**, meaning persons or agencies with an interest in the continuing existence of wetlands and in protecting them. Wetland managers can be any of a number of entities, including owners of properties that contain wetlands, staff of government agencies that have regulatory power over them, and conservation organisations with an interest in wetlands or holders of conservation interests. This Manual is particularly targeted at those **wetland managers who are involved in producing or implementing wetland management plans**, from the site level to the regional level.
- 2. Wetland policy makers**, meaning persons or agencies responsible for policy which may impact wetland sites or ecosystems.

## How to use this Manual

Given that it is unlikely that the reader will read the entire Manual from cover to cover (indeed it is not designed for this) there is some repetition of key concepts of disease emergence, prevention and control in wetlands - *this is intentional*.

### *If you are a wetland manager...*

We recommend that you read Chapters 1 and 2 in full, which provide an introduction to disease in wetlands and the principles of disease management in wetlands. These chapters explain the most important concepts in this Manual, namely why disease management is important, how to approach developing disease management strategies and the importance of considering disease management from an ecosystem perspective.

Whilst we recommend that you also read Chapters 3, 4 and 5, it is not necessary to read all the chapters or the sections of each chapter in chronological order. The reader is encouraged to begin with a topic of interest and follow the links and references included in the text for guidance to other chapters and sections.

► **Appendix II** provides a ‘Summary of Key Messages for Wetland Managers and Policy Makers’.

### *If you are a wetland policy maker...*

We recommend that you read Chapters 1 and 2 in full, which provide an introduction to disease in wetlands and the principles of disease management in wetlands. These chapters explain the most important concepts in this Manual, namely why disease management is important, how to approach developing disease management strategies and the importance of considering disease management from an ecosystem perspective.

Chapters 3 and 4 provide more detailed information on specific diseases and management practices and may be of less relevance to the policy maker. We recommend, however, that the introductions to these Chapters and a sample of the other sections are read to illustrate some of the practical challenges facing wetland managers. The following sections may be of particular use:

- ▶ **Section 3.1 Assessing risk and planning for the future**
- ▶ **Section 3.2 Reducing risk of disease emergence**

As Chapter 5 contains lists of sources of further information, this will be useful to a policy maker seeking further information on any of the Manual's topics; and ▶ **Appendix II** provides a 'Summary of Key Messages for Wetland Managers and Policy Makers'.

### *In addition to text...*

This Manual contains information boxes, graphics, check lists and case studies to try to make the guidance as clear and useful as possible. The following tools reappear through the text:

**Key messages for wetland managers and policy makers** boxes at the end of each chapter or introductory section provide wetland managers with a summary of each section's most important information, for example:

#### KEY MESSAGES FOR WETLAND MANAGERS AND POLICY MAKERS

- **'Disease'** is used to define **any impairment to health resulting in dysfunction**. There are many disease types, including: infectious, toxic, nutritional, traumatic, immunological, developmental, congenital/genetic and cancers.
- **Disease is often viewed as a matter of survival or death when, in fact, effects are often far more subtle**, and instead affecting productivity, development, behaviour, ability to compete for resources or evade predation, or susceptibility to other diseases factors which can consequentially influence population status.

**International regulations and standards** boxes highlight existing obligations under international agencies and conventions, for example:

#### INTERNATIONAL REGULATIONS AND STANDARDS

- The OIE Terrestrial Animal Health Code provides standards to assure the sanitary safety of international trade in terrestrial animals and their products.  
[www.oie.int/en/international-standard-setting/terrestrial-code/](http://www.oie.int/en/international-standard-setting/terrestrial-code/)
- The OIE Aquatic Animal Health Code provides standards to assure the sanitary safety of international trade in aquatic animals (amphibians, crustaceans, fish and molluscs) and their products.  
[www.oie.int/en/international-standard-setting/aquatic-code/](http://www.oie.int/en/international-standard-setting/aquatic-code/)

**Checklists** to aid in disease management planning and practice, for example:

CHECKLIST	
A broad range of data should be collected at a suspected outbreak, including:	
<input type="checkbox"/> Environmental factors	<input type="checkbox"/> Number sick/dead
<input type="checkbox"/> Estimation of disease onset	<input type="checkbox"/> Clinical signs
<input type="checkbox"/> Species affected	<input type="checkbox"/> Population(s) at risk
<input type="checkbox"/> Age	<input type="checkbox"/> Population movements
<input type="checkbox"/> Sex	<input type="checkbox"/> Specific features of problem areas

**Mini and full case-studies** illustrate the real problems that wetland managers face, for example:

CASE STUDY
“The project area is situated in the Tongxing Village of Wucheng Township, located in the Yongxiu County of Jiangxi Province. The Wucheng Township lies at the lakeshore of Poyang Lake, covering a total area of 368 km <sup>2</sup> , with 47 km <sup>2</sup> consisting of grasslands infested with snail fever...”

**Definitions** of main concepts or words used within the Manual [also ► [Appendix III. Glossary](#)], for example:

BASIC DEFINITIONS FOR THIS MANUAL	
<b>Health:</b>	a positive state of physical and mental well-being
<b>Disease:</b>	a departure from a state of health; any impairment to health resulting in physiological dysfunction; “dis-ease” means literally a departure from a state of ease.

**Boxes** of specific issues of relevance providing further information, for example:

FURTHER INFO 1-1. THE IMPACT OF CLIMATE CHANGE ON ANIMAL DISEASE
“Climate change is having an unprecedented worldwide impact on the emergence and re-emergence of animal diseases, including zoonoses. The recent rise in emerging infectious diseases has included considerable increases in the number of vector borne-emerging infectious diseases during the 1990s...”

**Figures, tables and other illustrations** are included to illustrate key concepts.

## Why this Manual was developed – the Ramsar context

The Ramsar Convention on Wetlands (Ramsar) has long recognised the multiple benefits provided by ecologically well-functioning wetlands, not just in their support of biodiversity but also in terms of services provided to human populations. Indeed, this issue was the theme of the tenth Conference of the Parties in 2008: "*Healthy Wetlands, Healthy People*". Such wetland services are especially important for impoverished communities, much of whose livelihoods or even food supplies may derive directly from wetland resources.

Should the natural ecological functioning of wetlands be impacted, the services provided can be reduced or even eliminated. The Millennium Ecosystem Assessment documents multiple ways through which this occurs and the consequences not just for livelihoods but also for human health<sup>2,3</sup>.

Disease represents one of the many ways in which services from well-functioning wetlands may be affected. Prior to Ramsar's work on the interactions between wetlands and human health<sup>4</sup> and the specific case of guidance concerning highly pathogenic avian influenza H5N1 adopted by Ramsar in 2008<sup>5</sup>, the Convention has not substantively addressed the issue of wetlands and disease before.

In 2008, CoP 10 requested Ramsar's Scientific and Technical Review Panel — in collaboration with other relevant organisations — to consider how best to develop practical guidance on the prevention and control of diseases of either domestic or wild animals in wetlands, especially those diseases that have implications for human health and further, how such guidance can be best incorporated into management plans at Ramsar sites and other wetlands. This Manual is a response to that request. It provides guidance and 'tools' for wetland managers and policy makers valuable in a range of contexts.

Disease is a 'cross-cutting' issue that has implications for a range of other wetland policy areas. Within the context of the Ramsar Convention and its national implementation, some of these other areas are indicated in ► **Table 0-2**, together with other sources of relevant Ramsar guidance.

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<sup>2</sup> Millennium Ecosystem Assessment 2005a. *Ecosystems and human well-being: wetland and water synthesis*. World Resources Institute, Washington, DC. 68 pp. [www.maweb.org/documents/document.358.aspx.pdf](http://www.maweb.org/documents/document.358.aspx.pdf)

<sup>3</sup> Millennium Ecosystem Assessment 2005b. *Ecosystems and human well-being: health synthesis*. World Resources Institute, Washington, DC. 53 pp. <http://www.maweb.org/documents/document.357.aspx.pdf>

<sup>4</sup> Ramsar Technical Report 6. Healthy wetlands, healthy people <http://www.ramsar.org/pdf/lib/rtr6-health.pdf>

<sup>5</sup> Resolution X.21. Guidance on responding to the continued spread of highly pathogenic avian influenza H5N1. [www.ramsar.org/pdf/res/key\\_res\\_x\\_21\\_e.pdf](http://www.ramsar.org/pdf/res/key_res_x_21_e.pdf)

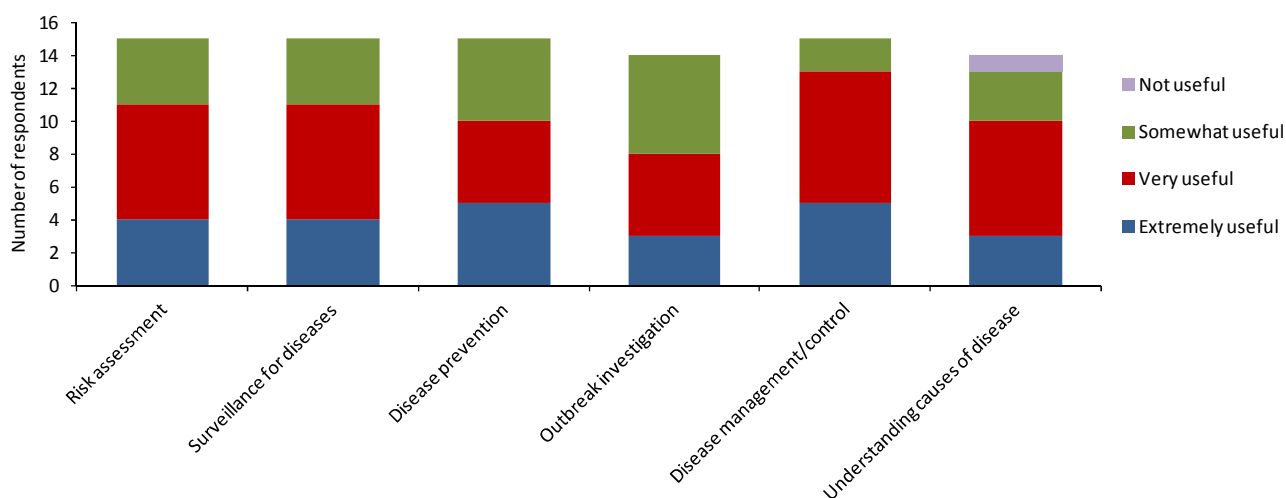
**Table 0-2.** A summary of Ramsar contexts related to diseases in wetlands.

Issue	Disease implications	Source of further Ramsar or other relevant guidance
<b>International co-operation</b>	Potential disease spread across international boundaries  Approaches for transboundary wetlands	<u>Ramsar Handbook 17. International cooperation</u>  National co-operation through OIE (World Organisation for Animal Health)
<b>Wetland management</b>	Multiple means through which varying management regimes can influence risk of disease	<u>Ramsar Handbook 16. Managing Wetlands</u>  <u>Wetland Management Planning. A guide for site managers.</u>
<b>Poverty alleviation</b>	Disease can have major impacts on livelihoods derived from wetland resources including incomes	<u>Resolution IX.14. Wetlands and poverty reduction</u>  <u>Resolution X.28. Wetlands and poverty eradication</u>
<b>Biodiversity conservation</b>	Disease can influence the status of individual species important as reasons for the qualification of wetlands as Ramsar sites	<u>Ramsar Handbook 17. Designating Ramsar Sites</u>
<b>Change in ecological character</b>	In some circumstances, disease can influence the nature of ecological communities and hence the ecological character of wetlands	<u>Ramsar Handbook 15. Addressing change in ecological character</u>
<b>Wetlands and human health</b>	A substantive review of relationship between well functioning wetlands and human health	<u>Ramsar Technical Report 6. Healthy wetlands, healthy people</u>
<b>Avian influenza and wetlands</b>	Preparing for and managing avian influenza	<u>Handbook 4. Avian influenza and wetlands</u>

## How this Manual was developed

### User needs survey

To assess current needs, an international questionnaire survey of needs of wetland managers and other professionals in was conducted in 2010. Responses were received from 55 professionals from 17 countries (Argentina, China, India, Indonesia, Italy, Japan, Lebanon, Malaysia, Netherlands, Paraguay, Philippines, South Africa, Switzerland, Turkey, United Kingdom, United Arab Emirates and United States). These responses, such as that illustrated in ► **Figure 0-2** from the group of respondents referring to themselves as ‘wardens’, helped to direct the structure and content of the Manual.



**Figure 0-2.** Responses from ‘wetland wardens’ to the question, “What are your current priority needs for information with respect to the prevention or control of wildlife disease in protected areas?”

### Workshops and meetings

Two expert workshops were held to develop the Manual, one at WWT Slimbridge (2010) and one hosted by Food and Agriculture Organisation (FAO) of the United Nations in Rome, in the same year, during which the wetland disease prioritisation task was conducted.

A number of smaller planning meetings were also held.

Calls for case studies for the Manual were put out electronically and also at two international conferences: European Wildlife Disease Association ‘Healthy Wildlife, Healthy People’ conference held in Vlieland, Netherlands, 2010; and the ‘OIE Global Conference on Wildlife - Animal Health and Biodiversity – Preparing for the future’ held in Paris, 2011.

Valuable input from Ramsar’s STRP was provided at various stages of planning and drafting.



## *Sources of information*

The information in this Manual was developed from the knowledge and experience of over 30 authors, contributing authors and technical editors. Additional information was gathered from:

- a review of existing sets of guidelines for managing animal disease;
- a review of guidelines for managing wetland sites;
- scientific articles in peer-reviewed journals;
- other published and unpublished documents;
- materials used in training courses; and
- the outputs and information gathered from two expert workshops.

The following websites were the main providers of information not sourced from peer-reviewed journals:

- World Organisation for Animal Health ([www.oie.int/eng/en](http://www.oie.int/eng/en));
- UN Food and Agriculture Organisation ([www.fao.org](http://www.fao.org));
- World Health Organization ([www.who.int](http://www.who.int));
- US Centers for Disease Control ([www.cdc.gov](http://www.cdc.gov));
- National Wildlife Health Center (<http://www.nwhc.usgs.gov>);
- Australian Government ([www.health.gov.au/pubhlth](http://www.health.gov.au/pubhlth));
- New Zealand Government ([www.moh.govt.nz/moh.nsf](http://www.moh.govt.nz/moh.nsf));
- UK Government ([www.defra.gov.uk](http://www.defra.gov.uk));
- Wildlife Disease Information Network ([wildlifedisease.nbio.gov](http://wildlifedisease.nbio.gov)); and
- Wildlife Information Network WILDPro ([www.wildlifeinformation.org](http://www.wildlifeinformation.org)).

The disease factsheets [**▶ Chapter 4. Animal Diseases Currently Causing Concern in Wetlands**] were largely compiled from literature produced by the veterinary, wildlife management, agriculture and public health sectors together with the technical expertise of the contributors. The information has been re-packaged (with acknowledgment) into factsheets specifically for wetland managers and supplemented, where appropriate, with information from scientific articles on wetland management and wetland management guidelines as published by the Ramsar Convention.

