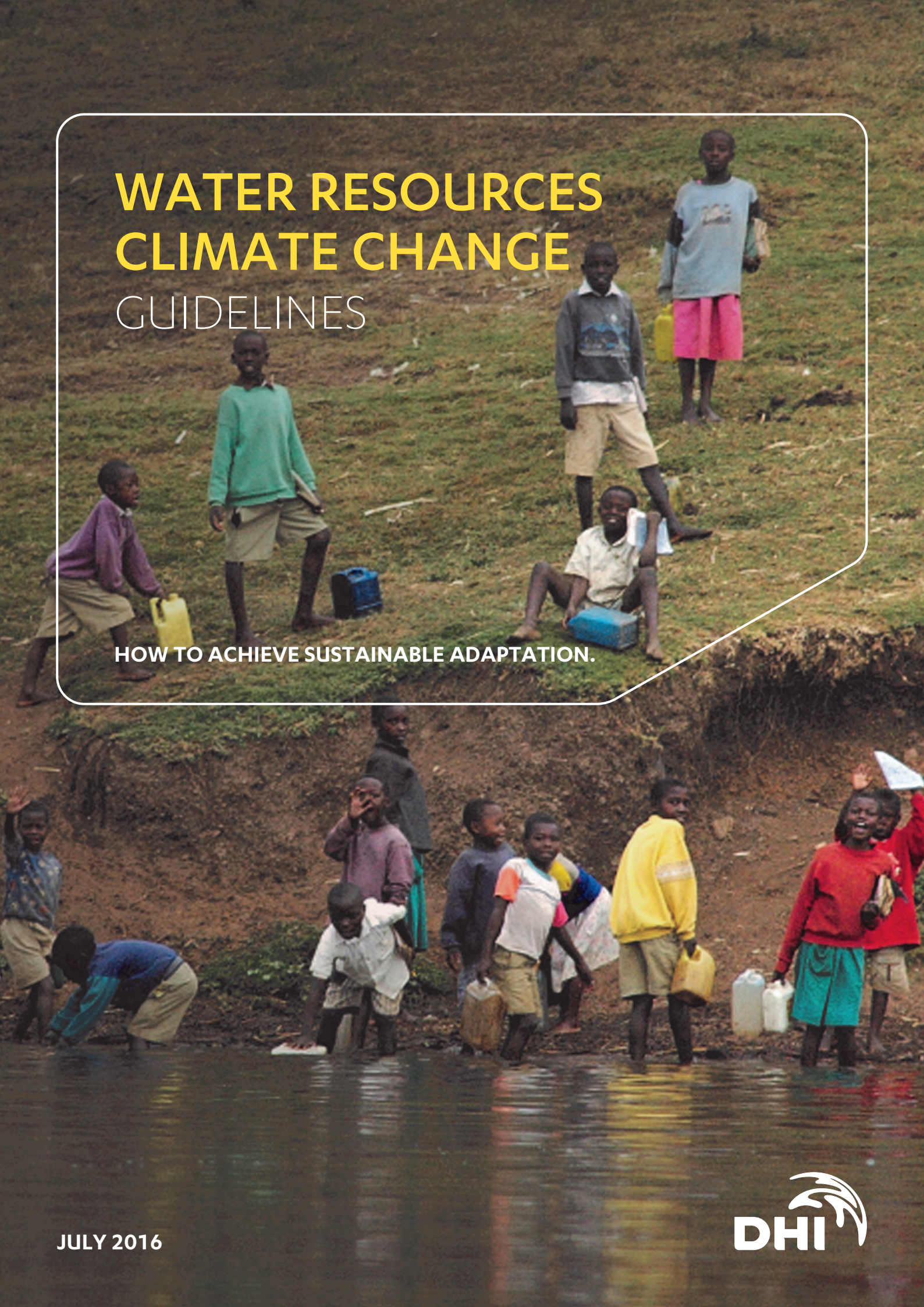

WATER RESOURCES CLIMATE CHANGE GUIDELINES

HOW TO ACHIEVE SUSTAINABLE ADAPTATION.

JULY 2016

DHI

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APPENDICES

Disclaimer

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Prologue

Who Should Read This Guide?

This practical guide is primarily written for water resources engineers, hydrologists, managers, and planners. Although not written explicitly for policy makers, advisors within government, water resources commissions and basin organisations may also find it useful to get an overview of strategies, methodologies and tools available for incorporating climate change impacts into water resources management.

Aim

The aim is to provide practical guidance on how to incorporate climate change when dealing with existing challenges in water resources management. Starting from a water resources management perspective, it provides an introduction to the key issues, practical guidance on how to consider climate change, and links to further information at each step.

The impact of climate change on water resources management is a complex issue and the volume of knowledge in this field continues to grow rapidly. Initially, much of the literature focussed on developing climate projections. Subsequently, these projections have been applied to numerous studies using many different methodologies to assess the impact of climate change on many sectors including water resources. Most recently, recognising the potential impact on water resources, efforts have focussed on developing appropriate adaptation measures and incorporating climate change into long-term planning cycles.

This document is not meant as a complete guide to the field of climate change in water resource management. Nor is it a substitute for expertise and experience dealing with climate change. It should, however, provide the reader with an overview of the methodologies, tools and strategies available for impact assessment and adaptation to climate change, and what is involved in implementing them.

Motivation

Nearly all the methodologies available for assessing the potential impacts of climate change on water resources are based on using climate model data and water resources modelling. Similarly, if such an assessment indicates that the water resource, water infrastructure or ecosystem of interest is vulnerable to climate change then evaluations of alternative measures to adapt to climate change often rely on model simulations of these alternatives. DHI is well-known in the field of hydroinformatics for both the development and application of water resources modelling tools and decision support systems. This guide supports the effective application of these water resources tools in the context of climate change.

Scope

The scope of this document should be broad enough to be relevant for a wide range of water resources issues across many of the related sectors, whilst still providing enough relevant practical guidance.

The types of projects that these guidelines are relevant to include, but are not limited to, the following:

- Flood management

- Integrated water resources management
- Ecosystem conservation and restoration
- Infrastructure design and management.

The framework, methodologies and tools for analysis contained in this document can be applied to these and many other types of projects.

Illustrative examples are provided throughout and more detailed case studies given at the end. This guide is, however, designed to be broad enough to apply to most locations throughout the world. It provides guidance on how to approach specific projects and use global, regional, and local information.

As water resources management ranges from highly localised issues like flood protection to catchment, national and even transnational water allocation, the framework provided in this guide should be applicable to projects of all scales. Guidelines are tailored to provide options depending on the economic, human, and technical resources available.

Structure

The document is structured around the workflow for undertaking a climate change study:

1. Defining the problem

Define the nature of problem you are trying to address, the objectives and priorities of the study, relevant stakeholders and the approach to be taken.

2. Identifying options and assessment criteria

Identify a short list of options (e.g. infrastructure or management plans), which could be implemented to address the challenges outlined in step 1 and to decide on the criteria for assessing each option to select a preferred option or combination of options.

3. Formulating the water resources modelling approach

Decide how the impacts of climate change will be modelled to allow the necessary indicators to be calculated, which can be used to prioritise options.

4. Developing projections

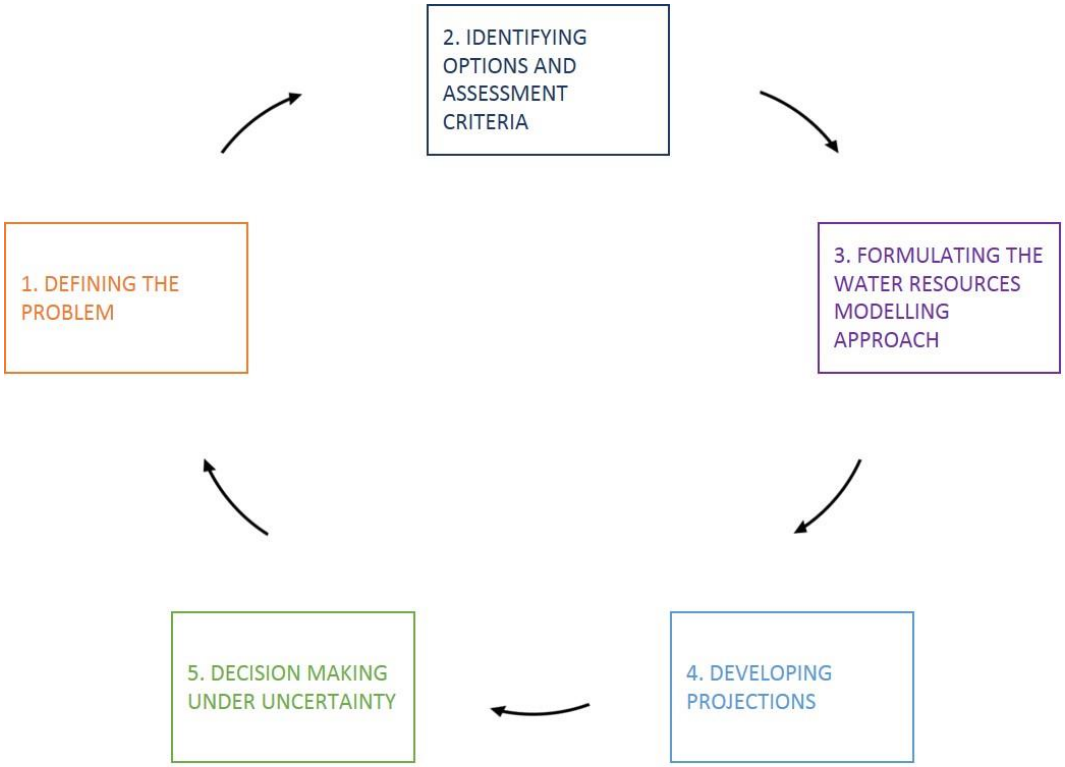
Develop projections of future climate, which can be used in water resource models to assess the impacts of the change and the performance of different infrastructure or management options.

5. Deciding on a preferred option or strategy, in light of the uncertainties

Make decisions about whether any of the options meet your objectives and decide on a preferred option or set of options, or decide to continue investigating other options (step 2) or even to reframe the question (step 1). Decide whether it is possible and necessary to reduce uncertainties (step 3 and step 4).

A chapter is dedicated to each of these steps (Chapters 1-5). There is no need to read this guide from cover to cover to get the information you want. You can just jump into the section you are most interested in. If your goal is to carry out an impact study to determine the effect of climate change on a specific water resource issue, then read Chapters 1, 3 and 4. Within each chapter a quick overview of the key messages and important information can be found in the “60-second Summary” boxes.

The following figure shows the structure of the document.



Different types of text boxes are included throughout the document:

60-SECOND SUMMARY…

Provides a brief summary of the content of the section.

WORKING WITH…

Presents practical guidelines to working with the methods presented.

UNCERTAINTY…

Information on uncertainty and its impacts in relation to the different parts of the workflow.