

Manual for determining the water requirement of wetlands

As it is obvious from the term ‘wetland’, the survival of wetlands always depends on the presence of water with suitable quality and quantity. Therefore, the first necessary step for conservation and comprehensive management of the catchment area of wetlands is to understand the amount of water needed by the wetland to continue its life and maintain its functions and services for the human societies and biodiversity that depend on it. In other words, the most important component for maintaining the value and services of the wetland is calculating the environmental water requirement of the wetland in the form of the integrated management of the resources in the catchment area as well as supplying that water for the wetland. In order to deal with this issue based on a plan-based perspective, the ecological approach provides a strategy for the integrated management of water, soil, and livelihood resources, based on which protection of the environment is emphasized through recognizing reasonable economic utilization, considering the role of the human beings, particularly local communities, as well as considering the relationship among various elements of the ecosystem. Through the partnership between the government of the Islamic Republic of Iran with the UNDP and the Global Environment Facility (GEF), the CIWP has tried to introduce the ecological approach as an underlying context for establishing a new and comprehensive management method for the country’s wetlands. In order to expand its achievements and establish an ecological approach for the management of the country’s wetlands, and based on the importance of understanding the environmental water requirement for planning the integrated management of the catchment areas of these valuable ecosystems, the project understood the necessity of introducing a set of guidelines and directives for calculating the water requirements of the wetlands, and started developing such guidelines based on the available experiences in order to streamline the available methods and accelerate the decision-making process in this regard. The main objective of the development and publication of this book involves promotion of the awareness of experts, managers, specialists, researchers, and most importantly, the policymakers in the field of environment and water resource allocation in order to conserve and protect wetlands and estimate their water requirements, while also paving the way for effective dialogues in this area. The investigations underlying the development of this book were carried out in the course of a partnership between the CIWP (Conservation of Iranian Wetlands Project) and Asarab Engineering Consultation Firm in a two-year period; along with utilizing the documentation available on this issue, the experiences of CIWP in the selected

wetlands were also considered. When developing this book, it was tried to provide a general overview of the main indicators and measures required for calculating the water requirements of the wetlands. This book consists of three chapters as follows. The first chapter deals with the general characteristics of the wetlands and their classification. The main objective of this chapter is to classify and categorize the wetlands and their different values as well as the introduction of parameters necessary for studying the water requirement of wetlands. The second chapter consists of guidelines for the water requirements of wetlands, and it discusses conventional methods for calculating the water requirement, as well as the advantages and disadvantages of these methods, followed by a general summary of all the available methods. This chapter discusses the parameters influencing the physical-chemical, biological, and socioeconomic studies, and ultimately proposes a step-by-step methodology for calculating the water requirement of a wetland. The third chapter provides the guidelines for calculating the water requirements of a wetland. This chapter tries to utilize relations, whose importance for a wetland had been shown in previous chapters, to pose questions that guide the reader towards identifying the most important measure(s) for calculating the water requirement. Moreover, this chapter utilizes these relations to obtain a defendable methodology for calculating the water requirements of a wetland by covering all the hydrological and ecological conditions.

Considering the climate conditions in Iran in terms of the environment, aquatic ecosystems, particularly wetlands, pay a key role in the conservation of biodiversity and even the adjustment of other land ecosystems. This is while wetlands are considered one of the most important and rich natural ecosystems on their own. Wetlands have various ecological and environmental functions. In addition to highly diverse environmental functions, wetlands are completely dependent on the state of water resources in the relevant catchment area. The water volume in catchment areas, the quality of the water, and the state of the sediments are among the issues affecting wetlands. Based on these reasons, wetlands in many countries around the world have gone through significant changes, placing them among one of the most vulnerable natural ecosystems. Moreover, this sensitivity and vulnerability is much more intense in Iran. Various uses of water resources across catchment areas are different than the ways in which surface and underground water resources are utilized, which will, in turn, affect the water regime of the catchment area as well as the wetlands. Some of the executive processes of water resource development projects have numerous environmental impacts, including changes in the flow

pattern and the natural balance of rivers as well as reductions in downstream water levels, which are among the most important consequences. Such changes have serious negative impacts on natural ecosystems, particularly wetland ecosystems downstream from water resource development projects.

Currently, such plans have created a large number of problems for numerous wetlands in Iran, and these problems have become more prominent in recent years due to consecutive droughts, manifesting as withering of some wetlands as well as intense fluctuations in the level of the majority of wetlands. With regards to water resource development plans in future years, the problems of natural ecosystems, and particularly wetlands, will increase significantly. Therefore, it is highly important and urgent to develop scientific and appropriate methods for determining the actual water requirements of wetland ecosystems.

In the process of the management and allocation of water resources, because of the limitations in the resources and the increasing economic value of water as a main infrastructure required for the development and expansion of all sectors, the ecological needs of the nature have long been neglected. In the course of this process, the water resources, which were used by nature for many centuries to facilitate the formation and evolution of ecosystems, were gradually allocated to human consumption. Due to this process, some natural ecosystems suffered serious damages. Therefore, in recent decades, the necessity of carefully considering the water requirements and needs of natural systems gained more attention. Nowadays, this issue is one of the main concerns at the global level.

Considering the increase in water requirements, and the expansion of methods for utilizing water resources, and building dams and other aquatic structures, the water flows in many rivers around the world changed significantly. Moreover, direct utilization, implementing dam construction projects for storing and adjusting water, as well as transferring water between different catchment areas have resulted in the reduction of the water resources available for the downstream regions, and particularly wetlands. As a consequence of these changes, in addition to the threats exerted upon wetlands, as ecosystems with natural values, many of their functions as well as ecological and hydrological services have also been eliminated. This will firstly and mainly impact the human communities, especially low-income communities living around the wetlands, who depend upon the services and products of the wetlands. Therefore, the need to determine the minimum water requirements of aquatic ecosystems and the need to adjust environmental streams have gained

global attention as important challenges for the management of water resources and wetland ecosystems.

The current directive has been developed based on the guidelines for calculating the water requirements of wetlands. The above-mentioned guidelines include the necessary explanations and scientific support for explaining the basic foundations and scientific analyses for calculating the water requirements of wetlands along with explanations on the methodology of this process. The current directive has been prepared based on the arguments and explanations presented in the above-mentioned set of guidelines. When developing this directive, it has been tried to present the necessary executive steps for implementing the guidelines for calculating the water requirements of wetlands. Assuming that the user has already studied the basic foundations and the guidelines for calculating the water requirements of the wetlands, this directive will present the steps for calculating the water requirements of wetlands in a practical manner.