

# 湿地资源及管理实证研究

——以“千湖之省”湖北省为例

—— 葛继稳 著



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# 湿地资源及管理实证研究

——以“千湖之省”湖北省为例

**WETLAND RESOURCES AND THEIR MANAGEMENT:  
A CASE STUDY ON HUBEI PROVINCE, CENTRAL CHINA**

葛继稳 著

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## 内 容 简 介

本书概述了湿地的定义及分类,湿地的效益及评价,湿地研究的现状、进展与方向,湿地管理的基本原理与方法。以“千湖之省”——湖北省为实例,系统研究了湖北省湿地资源,包括湿地类型、面积、分布,以及湿地生物多样性(湿地高等植物、鱼类、两栖动物、湿地爬行动物、水禽和湿地兽类);提出了湖北省湿地分类系统、湿地植被分类系统、湖北省国际重要湿地标准;创建了国家和省级重要湿地标准,据此确定了湖北省32块国际、国家和省级重要湿地,详细介绍和评估了湖北省的重要湿地以及15个湿地自然保护区;创建了湿地生物多样性经济价值评估的新方法——野生动物司法价格法,并应用于湖北省湿地水禽经济价值评估;全面分析了湖北省湿地面临的主要威胁及其形成原因、湿地管理的现状及存在的主要问题;从湿地可持续发展和流域管理层次上探讨了湖北省湿地管理的策略及行动。

本书可供湿地生态学、环境科学、自然资源保护学、资源经济学、自然保护区学等专业的科研与管理人员及本科生、研究生参考。

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## 摘 要

根据湖北省湿地多年生态调查数据,本书首先研究了湖北省湿地类型、面积、分布,湿地生物多样性(湿地高等植物、鱼类、两栖动物、湿地爬行动物、水禽和湿地兽类)。其次,提出了湖北省湿地分类系统、湿地植被分类系统、湖北省国际重要湿地标准,建立了国家和省级重要湿地标准,并根据这些标准确定了32块国际、国家和省级重要湿地,详细介绍和评估了主要的重要湿地以及15个主要湿地自然保护区。再次,创建了湿地生物多样性经济价值评估的新方法——野生动物司法价格法,并应用于湖北省湿地水禽经济价值评估;分析了湖北省湿地面临的主要威胁及其成因、湿地管理的现状及存在的主要问题。最后,从湿地可持续发展和流域管理层次上探讨了湖北省湿地管理的策略及行动。作者希望本书能为湖北省湿地资源的保护、恢复和持续利用提供理论依据,并为政府相关部门湿地管理决策提供参考。主要结果如下:

(1) 提出了湖北省湿地分级式分类系统。该系统将湖北省湿地分为6级,包括了湖北省所有的湿地类型,便于与国家湿地分类系统进行衔接,实现不同部门、不同层次数据的汇总,且能与国际湿地局湿地分类系统接轨,符合《Ramsar 公约》的要求;同时,也能与湖北省湿地植被分类系统进行很好的衔接,尤其是进行6级以下分类时衔接非常理想。

(2) 报道湖北省湿地总面积为346.3503万 $\text{hm}^2$ ,占湖北省国土总面积的18.63%。其中,单块面积大于或等于100 $\text{hm}^2$ 的湿地有河流、湖泊、沼泽、库塘等四大类以及永久性河流等七小类,总面积为93.6244万 $\text{hm}^2$ ,占湖北省国土总面积的5.04%。河流(39.2512万 $\text{hm}^2$ )、湖泊(28.8498万 $\text{hm}^2$ )、库塘(19.6857万 $\text{hm}^2$ )和沼泽及沼泽化草甸(5.8357万 $\text{hm}^2$ )湿地面积分别占41.93%、30.82%、21.03%和6.23%。附录列出了湖北省680处主要湿地名录,其中河流湿地179条(块)(永久性河流155条,泛洪平原24块),永久性湖泊湿地261个,沼泽湿地14块(藓类沼泽4块,草本沼泽9块,森林沼泽1块),库塘湿地226个。

(3) 参照《Ramsar 公约》确定国际重要湿地的标准,提出了湖北省国际重要湿地标准,建立了国家重要和省级重要湿地标准,依此确定了32块重要湿地,并对长江、天鹅洲长江故道、沉湖、网湖、梁子湖、龙感湖、洪湖、涨渡湖、小河水杉森林沼泽9块国际重要湿地,汉江、忠建河以及万江河大鲵3个省级自然保护区、斧头湖、长湖、漳水库6块国家重要湿地以及清江、府坪河、沮漳河、鄖水、南河、西凉湖、汈汊湖、大冶湖、保安湖、黄盖湖、神农架藓类沼泽(2个)、隔河岩水库、富水水库、白莲河水库、徐家河水库、陆水水库17块省重要湿地中的主要类型进行了详细介绍与评估。

(4) 提出了湖北省湿地植被分类系统。将湖北省湿地植被初步划分为2个植被型组、7个植被型、48个群系,详细描述和评价了主要湿地植被类型。结果表明:①湖北湿地植被地带性分布规律不强,基本上为隐域性分布;西部神农架林区亚高山局部地区表现出山地植被垂直分布的特性。②以草丛沼泽和沉水植被类型为主。③具有独特或新发现的湿地植被类型。

(5) 查明湖北省湿地高等植物有1007种,隶属于103科327属,分别占中国湿地高等植物科、属、种的59.88%、66.06%、61.33%,占湖北省高等植物科、属、种的34.80%、

20.68%、15.74%。结果表明,湖北省湿地植物具有种类非常丰富、以湿生植物为主(水生植物以沉水植物为主)的特点;国家重点保护野生植物有5种(I级有蕹菜1种,II级有水蕹、粗梗水蕹、莲和野菱4种)。

(6) 按照“生态上依赖湿地”的原则,确认湖北省湿地野生脊椎动物计438种,隶属于28目73科224属。其中鱼类12目26科107属202种,两栖类2目10科19属51种,湿地爬行类2目8科23属35种,水禽7目19科58属131种,湿地兽类5目10科17属19种。结果表明:①鱼类以江汉平原区系的湖泊和河流鱼类为主,其中鲤科鱼类居多,占52.48%;两栖类、湿地爬行类和湿地兽类以东洋种为主;水禽以冬候鸟居多,占57.25%。②种类非常丰富。不但种类占全国的比例高达25.48%,而且占湖北省野生脊椎动物总数的比例高达48.13%,高于中国湿地野生脊椎动物占中国野生脊椎动物总数的比例(26.88%)。③国家重点保护野生动物35种(I级12种,II级23种),占湖北省国家重点保护野生脊椎动物总数117种的29.91%,占全国湿地国家重点保护野生脊椎动物总数113种的30.97%。

(7) 水禽是本书研究的重点。研究期间共观察到107种,占总种数的81.68%,其中发现黄嘴白鹭、小苇莺、红脚苦恶鸟和长嘴剑鸳4个新记录种;角鸬鹚等24种未发现种。湖北省水禽种群数量为1 593 969只,密度约为46只/km<sup>2</sup>;国家重点保护水禽24种3 838只(I级7种1 676只,II级17种2 162只);CITES附录水禽23种406 316只(附录I 6种1 505只,附录II 7种3 321只,附录III 10种,401 490只);湖北省重点保护水禽24种48 417只;国家“三有”水禽106种1 590 131只。

(8) 首次创建了湿地生物多样性经济价值评估的新方法——野生动物司法价格法(wildlife judicial price method),并应用于湖北省湿地水禽经济价值的评估。该法具有简单、规范、统一,不存在统计误差的优点,不但可广泛应用于中国范围内所有的国家保护野生动物经济价值的评估,而且能通过湿地主要物种——水禽的变化来定量评估湿地经济价值的变化。因此,该方法在湿地管理、评价中具有很强的实用性。根据该法,计算出湖北省湿地水禽总经济价值为257 210 058元人民币,平均每只为161元人民币。

(9) 用大量的数据论证了湖北省湿地面临的主要威胁有湖泊数量和面积急剧减少,地表水恶化、水体富营养化趋势明显和生物多样性下降等,其主要原因是围垦、基建与城市化、过度渔猎、大型水利工程的影响、水体污染和富营养化、水土流失以及外来种入侵等。分析了湖北省湿地管理在机构及能力建设、湿地自然保护区建设与管理、科研与监测、保护规划及法制工作、宣传教育、技术培训与科研合作等方面的现状,指出湿地管理中存在的诸多问题。运用最新生物多样性数据(尤其是水禽隆冬同步调查数据)介绍和仔细评价了15个湿地自然保护区。

(10) 在全面评述湖北省湿地资源及管理现状的基础上,应用湿地管理的基本原理以及湿地生态系统和流域管理的方法,根据湖北省社会经济发展和生态保护的要求,提出了湖北省可持续湿地管理的9个基本策略及20多项行动纲领,供政府决策参考。

另外,本书还概述了湿地的定义及分类,湿地的效益及评价,湿地研究的现状、进展与方向,湿地管理的基本原理与方法。

# Executive Summary

## Introduction

The study appraises and evaluates the wetland resources in Hubei Province, central China. identifies the driving forces, issues, strengths, weaknesses, opportunities, and threats to the region's wetlands; establishes wetland management objectives so that these can be incorporated, as far as is appropriate, into overall regional development objectives; and identifies key wetland management initiatives for further pre-feasibility study and possible inclusion in the Regional Plan.

## Scope of study and methodology

The study begins with a regional wetland appraisal and ornithological survey at the peak (winter period) of the waterfowl migration season. The information presented here is partly the result of an ecological survey of wetlands conducted throughout the region from 1996 to 2005, and secondary data from previous studies in the region.

Firstly, the types, area, distributions, biological diversities (including higher plants, fishes, amphibians, reptiles, waterfowl and mammals) of the wetlands were surveyed.

Secondly, two classification systems of wetlands and wetland vegetation, as well as an international important wetland criterion were established. Two new criteria of state and provincial importance of wetlands were set up in this study. Thirty two important wetlands, including fifteen nature reserves were appraised and evaluated according to three main criteria; the 9, 6 and 17 of international standards; the State and; the Provincial standards.

Thirdly, a new economic valuation method of wetland biodiversity-*wildlife judicial price method* was set up. This method was used to determine the economic value of waterfowl.

The main threats of Hubei's wetland biodiversity and the main problems management were also identified and analyzed.

Finally, some strategies for wetland management and corresponding actions for Hubei wetlands based on sustainable wetland and watershed management are proposed.

## Results

### 1. A hierarchical wetland classification for Hubei province is established

The system classifies wetlands into six levels, which could include all kinds of wetlands in this province. It has several advantages. For example, it can be linked to the state wetland classification system; provides a path for gathering data from various departments and different regional levels and scales, it is in conformity with the wetland classification system of the International Water-

fowl and Wetland Research Bureau (IWRB), and the Ramsar Convention. Finally, it can link up to the Hubei wetland vegetation classification system, especially in the lower ranks (below the sixth grade).

## **2. Distribution of wetlands in Hubei Province**

There is a total wetland area of 3 463 503  $\text{hm}^2$ , representing 18.63% of the surface area of the province. Of this area, 936 244  $\text{hm}^2$  (5.04% of the total surface area of the province) are above 100  $\text{hm}^2$ . In this category we have four types of wetlands which are the rivers (392 512  $\text{hm}^2$ ), lakes (288 498  $\text{hm}^2$ ), mires (bog, marsh, swamp and meadow; 58 357  $\text{hm}^2$ ), reservoirs (196 857  $\text{hm}^2$ ), as well as seven sub-types such as permanent rivers, permanent lakes, etc.

## **3. Internationally significant wetland sites**

According to the three classification criteria, nine wetland sites met with at least one of the Ramsar Convention criteria for international significance; 6 and 17 sites respectively, met one or more of reasonable set of criteria for national and provincial significance.

## **4. Hubei wetland vegetation classification is established**

The system divides the wetlands into two vegetation groups, 7 vegetation types and 48 formations. The main wetland vegetation types were identified and evaluated. The research indicates that most of the vegetation had intrazonal distribution. However, in the sub-alpine regions of the Shennongjia Forest District, the vegetation showed some zonation. The marshes and submerged vegetation are the dominant wetland vegetation types. Some particular and new wetland vegetations were discovered. For instance, the Association *Carex argyi* + *Eleocharis wichurii*, Association *Juncus concinns* + *Carex argyi*, Formation *Sphagnum palustre* and Formation *Polytrichum commune* distributed in Shennongjia Forest District (Dajihu, 1 650m). The two former Associations were Chinese endemic marsh vegetation types, the third formation was the bog vegetation type only distributed in Hubei and rarely in south China, and the last formation was the new bog vegetation type firstly discovered in Hubei province. Formation *Aulacomnium palustre* and Formation *Physocladus sphaericum* discovered in Shennongjia Forest District (Laojunshan, 2 450 ~ 2 470 m) and in Yangtze River floodplain respectively were the new bog vegetation types in China.

## **5. Wetland/wetland-dependent species present and their status**

### **5.1 Wetland plant species**

Hubei's wetlands have 1 007 higher plant species of 327 genera and 103 families have been identified and recorded. These represent 59.88%, 66.06% and 61.33% of the total families, genera, and species of China wetlands higher plants respectively, as well as 34.80% of Hubei's wetland's higher plants at family level, 20.68% at genus level, and 15.74% at species level. Most of these plant species are hygrophytes. Five national key protected plant species are distributed in the wetlands including, one species of class I (*Brasenia schreberi*), and four species of class II (*Ceratopteris thalictroides*, *Ceratopteris pteroides*, *Nelumbo nucifera* and *Trapa incisa*).

### **5.2 Wetland-dependent mammal, amphibian, and reptile species**

A total of 438 wild vertebrate species in 224 genera, 73 families, and 28 orders were recorded in

Hubei wetlands. Of these, 202 species belonging to 107 genera of 26 families and 12 orders were fish; 51 species in 19 genera of 10 families of 2 orders were amphibians; 35 species in 23 genera of 8 families of order 2 were wetland reptiles; 131 species in 58 genera of 19 families of 7 orders were waterfowl; and 19 species in 17 genera of 10 families of 5 orders were wetland mammals.

The fish component of faunas were found mostly in the lakes and rivers of the Jiangnan plain, in which Cyprinidae species accounted for 52.48%; the amphibians, wetland reptiles and wetland mammals were mainly oriental species. Winter migrants dominated the waterfowl species according to seasonal patterns.

The wetland species represented not only 25.48% that of China, but also 48.13% of total wild vertebrate species in Hubei. This is higher than the proportion (26.88%) of China total wetland wild vertebrate species to China total wild vertebrate species. It showed that Hubei is very rich in wetland species. There are 35 national key protected wild animal species (12 species as first-order protection, and 23 as second order) in Hubei wetlands, accounting for 29.91% of Hubei's total protected species (117 species) and 30.97% of China wetland protected species (113 species).

### 5.3 Waterfowl and wetland-dependent birds

The ornithological studies show that despite the massive habitat losses, the region remains an internationally important wintering area of migratory waterfowl. The counts are thought to represent 81.68% of the total number of waterfowl present in the region – 131 species belong 58 genera of 19 families of 7 orders, of which 107 species were recorded in our studies. Four waterfowl species (*Egretta eulophotes*, *Ixobrychus minutus*, *Amaurornis akool* and *Charadrius placidus*) were first recorded in Hubei. Twenty-four species were not recorded during our investigation and could be extinct or extremely endangered in Hubei wetlands.

1 593 969 individuals were estimated as the total number of waterfowl in Hubei province and the intensity was about 46 individuals per km<sup>2</sup>. Among these waterfowl, the number of *Fulica atra* was the highest, with 153 450 individuals, and there were 28 species whose population numbers were more than 10 000 individuals, in which 3 species such as *Fulica atra*, *Egretta garzetta* and *Tachybaptus ruficollis* were all above 100 000 individuals. Of the known waterfowl species, 24 species with 3 838 individuals were graded as national key protected birds, 23 species with 406 316 individuals were ranked the threatened birds by CITES, 23 species with 8 247 individuals were the IUCN red list of threatened birds, and 22 species with 3 615 individuals were listed as China red list of threatened birds. The results also show that Hong Lake, Chen Lake, Longgan Lake, Liangzi Lake and Wang Lake could be ascertained as the Ramsar international important wetlands in terms of 1% criterion of the globe waterfowl geographical population.

## 6. Wetland resource utilization and values

### 6.1 Resource utilization

Many wetland plants and animals are used locally and/or traded to urban centers and internationally. These uses include fodder, fuel wood, and fertilizer derived from wetland plants; tree bran-

ches used for fish aggregation; wild animal and plant foods; luxurious items such as tortoise shells; and many others. In addition, the wetlands provide important *in situ* services, the most important of these include erosion protection of village homesteads in the deeply flooded areas; fish habitat and food; and flood storage.

## **6.2 Valuing wetland resources-Wildlife Judicial Price Method ( WJPM )**

It is a new economic valuation method of wetland biodiversity developed in this study. It was used to determine the economic value of waterfowl in this region. The method is simple, standard, unified and free of statistical errors. It can be extensively applied to evaluate all national protected animals in China, and could evaluate the economic losses quantitatively because of the destructions of biodiversity. According to the Wild Life Judicial Method, the total value of Hubei's waterfowl stands at RMB 257 210 058. The average value is RBM 161 per individual.

## **7. Driving forces or threats to wetland resources**

Based on our survey, the main threats to Hubei's wetlands and habitats include, surface water pollution, eutrophication of water bodies, shrinkage in the number and area of lakes, wetland reclamation, industrialization, urbanization, over fishing, excessive hunting, influence of large water conservancies, water and soil losses, and invasion by alien species.

Over the coming years, a number of driving forces will likely tend to maintain or change the status of Hubei's wetlands; increasing rural-urban links; continued dependence of local people on local resources for biomass and other necessities; rural impoverishment pushing local people into wetland resource gathering for own use and sale; expansion of new technologies in water management, agriculture, and other sectors; increasing and widening local, urban, national and international markets and probably because of the high demand for wetlands products.

## **8. Strategies of sustainable management and outlines of actions on Hubei wetlands**

On the basis of reviewing the wetland resources and management status, 9 particular strategies and over 20 activities for Hubei wetlands sustainable management were put forward according to basic theories of wetland management and the methods of wetland ecosystem and watershed management.

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# 第1章 湿地的定义与分类

湿地(wetland)是由喜湿生物和浸水环境构成的独特的自然综合体,是自然界中的一类非地带性景观类型。按照景观生态学原理,陆地可看成是湿地镶嵌的背景基质,湖泊、河流、稻田等是这一背景中的一个个富水的斑块,溪流、江河、渠系等则是联系这些斑块之间的廊道(傅伯杰等,2002)。湿地发育于陆地生态系统(如森林、草地)与水域生态系统(如深湖、海洋),是一种水陆过渡性质的生态系统,它兼有陆地和水域生态系统的某些属性,但又明显不同于原来各自的生态系统。世界自然保护联盟(IUCN)、联合国环境规划署(UNEP)和世界自然基金会(WWF)在编制世界自然保护大纲时,把湿地与森林、海洋一起并称为全球三大生态系统,并将淡水湿地视为濒危野生生物的最后集结地。

## 1.1 湿地的定义

湿地的中英文原意都是指过度湿润的土地。由于湿地的类型、大小、区位和环境条件的复杂多样,因此,尽管世界湿地研究已有100来年的历史,不同学科的学者从不同的角度来看待湿地,提出了近60种形形色色的定义,但目前尚没有一个统一的、科学意义上的湿地定义。正如国际湿地学会主席William J. Mitsch等1986年在其所著的《湿地》(Wetlands)一书中对湿地概念进行系统描述的那样:“由于认识上的差异和目的的不同,致使不同的人对湿地的定义强调不同的方面。如湿地科学家感兴趣的是弹性较大、全面而严密的定义,便于进行湿地分类、外业调查和研究;湿地经营者则关心管理条例的制定,以阻止或控制湿地的人为改变,因此需要准确而具有法律效力的定义。由于人们的这些不同需要,就产生了各种不同的湿地定义。”

根据湿地定义外延和内涵的差异,可将湿地定义划分为狭义和广义两种。下面简要介绍国内外目前较有代表性的湿地定义。

### 1.1.1 狭义的湿地定义

狭义的湿地定义把湿地看作是陆地生态系统与水域生态系统的交错区或过渡地带。不同国家和学者的定义主要有以下几种:

#### 1.1.1.1 美国的定义

美国于20世纪中叶以后才逐渐重视湿地的研究,尽管起步较晚,但十分重视湿地研究和湿地管理工作,除成立了湿地科学家协会(Society for Wetland Scientists)和一些湿地研究中心外,还出版了《美国湿地及其深水生境的分类》(Classification of Wetlands and Deepwater Habitats of the United States)(Cowardin et al., 1979)、《湿地管理》(Wetland Management)(Zinn and Copeland, 1982)和《湿地》(Wetlands)(Mitsch and Gosselink, 1986)等著作,并在不同时期提出了多种湿地定义,具代表性的有:

1) 美国39号通报(Circular 39)的定义。1954年,美国鱼和野生动物保护局首次开展

湿地清查与编目工作,重点放在与水禽栖息地有关的重要湿地。根据这次湿地详查结果,他们结集出版了一本报告集,即《美国的湿地》(Shaw and Fredine,1956),通常被称为“39号通报”。

这是最早的湿地定义之一,即湿地“是指被浅水和有时被暂时性或间歇性积水所覆盖的低地。它们常常以草本沼泽(marsh)、木本沼泽(swamp)、藓类沼泽(bog)、湿草甸(wet meadow)、塘沼(pothole)、淤泥沼泽(slough)以及滨河泛滥地(bottom land)等名称被众所提及。浅湖或浅塘通常以挺水植物为显著特征,也包括在这一定义之中。但河流、水库和深水湖泊等稳定水体不包括在内,因为这些水体不具有这种暂时性,对潮湿土壤植被的发展几乎毫无作用。另外,泥炭沼泽(mire)是泛指泥炭积累的湿地生态系统,湿原(fen)是指受周期地下水或地表径流补给的低位营养沼泽。”这一定义目前常被湿地科学家和管理者引用(王宪礼、肖笃宁,1995)。

39号通报的定义强调了湿地作为水禽生境的重要性,包括了20种湿地类型,至今仍是美国所用的主要湿地分类基础,但该定义对水深未作规定。

2) 美国陆军工程军团的定义。美国陆军工程军团(The US Army Corps of Engineers)在1977年“净水行动”增补本的404议案要求下,对湿地给出的定义是:“湿地是指那些地表水和地面积水浸淹的频率和持续时间很充分,能够供养(在正常环境下确实供养)适应于潮湿土壤的植被的区域。通常包括木本沼泽、草本沼泽、泥炭藓沼泽,以及其他类似区域。”这一概念只给出一项指标即植被,主要是为了法律和管理中应用的简便(Mitsch and Gosselink, 1986)。

3) 美国鱼和野生动物保护局的定义。美国鱼和野生动物保护局的科学家们经过多年的考察研究,在1979年发表了研究报告《美国湿地及其深水生境的分类》,对湿地提出了较为综合的定义,即“湿地是指陆地生态系统和水域生态系统之间的转换区,其地下水位通常达到或接近地表或处于浅水淹覆状态……,至少具有下列一个或几个属性:①水生植物至少周期性地占优势;②基底以排水不良的水成土为主;③若土层为非土壤(nonsoil)(非土壤是指非自然发生的土壤,如填土、冲洪积物,一般土层较薄,一般小于10cm,土体结构不明确;还包括有机物厚度低于40cm且水淹的粗骨土),则被水淹,或在每年生长季的部分时间内被水浸或水淹。”其中包括湖泊在低水位时水深2m以内的地带,但水深超过2m的湖泊地带不纳入湿地的范畴(Cowardin et al., 1979)。

当前,这一概念在美国湿地学界被广为接受。这一概念包含了对植被、水文和土壤的描述,主要适于科研应用。印度将这一概念作为官方湿地概念;美国的一些州把这一概念作为立法概念。和39号通报概念一样,这一概念为美国的湿地分类和湿地综合详查提供了依据。

4) 美国 William J. Mitsch 等的定义。国际湿地学会主席 William J. Mitsch 等在《湿地》一书中,综合各种湿地定义的内涵后认为,湿地应包括以下3点:①湿地是以水的出现为标准来确定的;②湿地通常具有独特的、不同与其他地区的土壤;③湿地生长着适应于潮湿环境的水生植物。此外,湿地还有许多与其他生态系统相区别的特征,如:①尽管湿地阶段性地积水,但积水深度和积水时间各不相同;②湿地常处于陆地和深水体间的共同边缘区,且同时受水体与陆地两种生态系统的影响;③湿地面积差异很大,小则几公顷,大则几万公顷;④湿地分布广泛,从内陆到滨海,从乡村到城区都有分布;⑤湿地受人类活动的影响,人

类影响湿地的程度在不同的区域及不同类型的湿地上变化十分巨大(Mitsch and Gosselink, 1986)。

《湿地》是美国湿地研究最综合、最全面的文献,但这一定义最大的问题是湿地范围没有明确的界线。

#### 1.1.1.2 加拿大的定义

加拿大国家湿地工作组在进行北方(寒带)内陆泥炭地(peatland)研究中提出了一种特殊的湿地定义。在该工作组的一次讨论会上,S. C. Zoltai(1979)把湿地定义为:“湿地系指被水淹或地下水位接近地表,或浸润时间足以促进湿成和水成过程(wetland and aquatic processed),并以水成土壤、水生植被和适应潮湿环境的生物活动为标志的土地。”加拿大的湿地定义强调湿润土壤条件,尤其是生长季节的湿润土壤条件。

1987年,在加拿大埃德蒙顿(Edmonton)国际湿地与泥炭研讨会上,加拿大学者对湿地的定义是:“湿地是一种土地类型,其主要标志是土壤过湿、地表积水(但水深不超过2m,有时含盐量高)、土壤为泥炭土或潜育化沼泽土,并生长有水生植物。水深超过2m的,因无挺水植物生长,则算作湖泊水体”。这一定义提出了水深不超过2m的指标(National Wetlands Working Group, 1988)。

#### 1.1.1.3 英国的定义

英国J. W. Lloyd等1993年将湿地定义为“一个地面受水浸润的地区,具有自由水面,通常是常年积水,或季节积水,但也有可能在有限的时间内没有积水。自然湿地的主要控制因子是气候、地质和地貌条件,人工湿地还有其他控制因子。”

#### 1.1.1.4 日本的定义

日本学者井一(Tatsuichi Tsujii)1993年认为,“湿地的主要特征首先是潮湿,其次是地下水位高,三是至少在一年的某一段时间内土壤水处于饱和状态。土壤积水导致特征植被发育”。这一定义与英国的湿地定义一样,强调水分和土壤,而忽略了植被状况(王宪礼、肖笃宁,1995)。

#### 1.1.1.5 中国的定义

中国学者对湿地的明确定义还很少见,许多学者倾向于认同美国关于湿地的定义(赵魁义,1988;徐琪,1989)。

佟凤勤、刘兴土和赵魁义(1995)对湿地作了如下的定义,即“湿地是指陆地上常年或季节性积水(水深2m以内,积水期达4个月以上)和过湿的土地,并与其生长、栖息的生物种群构成的独特生态系统。”这一概念强调了构成湿地的三要素:积水、过湿地及生物群落,但并未明确地说明3个因子的组合与湿地之间的确定关系,同时对水质状况亦未加说明,但这被认为是国内最完整的一个有关湿地的定义(王宪礼、肖笃宁,1995)。

陆健健(1996)参照《关于特别是作为水禽栖息地的国际重要湿地公约》(简称《湿地公约》或《Ramsar公约》)及美国、加拿大和英国等国的湿地定义,根据我国的实际情况,定义我国湿地为“陆缘为含60%以上湿地植物的植被区;水缘为海平面以下6m的近海区域,包括内陆与外流江河流域中自然的或人工的、咸水或淡水的所有富水区域(枯水期水深2m以上的水域除外),无论区域内的水是流动的还是静止的、间歇的还是永久的”。并对湿地的要素、条件和类型进行了界定。